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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

ADDRESS TO THE HENRICO AGRICULTURAL SOCIETY, BY THE PRESIDENT, THE REV. JESSE H. TURNER. DELIVERED MAY 26, 1841.

(Continued from last number.)

But I must pass on, or I shall subject myself to the same charge which I am condemning in others. As, however, I receive no pay for my speech from the state, nor from any other quarter, I hope you will bear with me; and I promise to make no more speeches, either long or short, unless you call me to it.

But, gentlemen, an enclosure of some kind we must have: and that which is most convenient, requiring the least cost, and is found at the same time to answer the purpose, is upon the whole the best in any particular case. If, however, stone were abundant and convenient to me, I think I should feel no hesitation in availing myself of that material to construct my fences with. It might cost a little more at first, but then the great durability and strength of the structure would more than compensate for the original outlay. But in the absence of stone, the post and board, or post and rail, will make an excellent fence. These placed on the bank of a ditch, and kept in good repair, will present a very formidable barrier to the depredations of mischievous animals.

I have had some experience with what is generally called the *live fence.* About thirteen years ago, I enclosed the whole of the farm which I then owned, with the cock-spur hawthorn. Since that I have added considerably to my farm and somewhat to my thorn fence. It now forms a line perhaps two miles long. The only trouble it gives me is to prune it every fall: and with a single board at the bottom, I find it answers the purpose remarkably well.

There is yet one other fence, of which I wish to say a word or two; that is the old fashioned worm fence. To this, I think, there are many solid objections. In the first place, it is a slovenly affair, and therefore offensive to the sight. And then it occupies more space, and requires more material in its construction, than any other fence. In addition to all this, it is certainly the weakest of all the barriers that we put around our farms. A strong bull or a mischievous ox will demolish it in less time than I have spent in talking about it—and every time the wind blows hard the prudent man will go out, and it is ten to one if he does not find it prostrate in many places. I once knew a man remarkable for his energy. No difficulty nor obstacle seemed to present a barrier in his way. He went straight forward, and generally succeeded in accomplishing his purposes. In conversation with him, (and I like such persons,) and in calling his attention to this trait in his character, he remarked that he had adopted these remarkable words for his motto—Aut inveniam aut faciam." (It is his Latin, gentlemen, not *mine.)* Now see one of our long-snouted, lank-sided rooters approach such a fence—he gives a grunt, and there is something foreboding evil in that grunt—the meaning is, in hog Latin—aut inveniam aut faciam—and with that, introduces his lean carcass to the rich stores of the corn field: and now commences the chase with clubs, and stones, and dogs, until the rooter is fairly dislodged. Nor is this all—for now commences a much worse thing—*quarrels among neighbors.* This must suffice as to enclosures, for as to that other miserable substitute called a *watling*; especially when cedars are not plenty, I consider it too contemptible to say a word about it.

As to the *buildings*, especially the family dwelling, I think it necessary to say but very little. All will agree that it ought to be constructed with a special reference to convenience and comfort; and in the material used and style of finish, every man will, of course, consult his own taste and circumstances. I must, however, remind you, that this is the great sanctum of our wives and daughters; for it is here, together with the kitchen, and dairy, and poultry house, and garden, that we expect them to discharge the important duties of their station. I need not remind my fair country-women that if they fail in their appropriate sphere—if, on the contrary, they lend not a constant, a steady, and faithful hand, in their proper station, there is wanting a link, an *important* link in the great chain of good management. But there are other buildings necessary on a farm, without which the system of management cannot be called a good one. These are the barn, or some substitute for it, together with shelters for our stock, which our long and inclement winters have of late rendered so necessary. In this respect, in this section of country, I fear, I know, that our farms are wretchedly deficient. I do not ask you if you have a stable for your horse or mule; I presume there is no farm destitute of this indispensable appendage. But how did your cow and your hog fare during the late inclement season? Did they enjoy a comfortable shelter whilst the storm was raging around them?

This subject, gentlemen, I cannot press too earnestly upon your attention. In this way, we gratify the feelings of our humanity; for who can rest comfortably in his bed on a cold night, when amidst the peltings of the pitiless storm, he hears rising above it the lowings of his cattle and the lamentations of his swine. Besides, by attending to this thing, he does but consult his own interest; for it is an admitted fact, that the well sheltered beast requires less food, and in addition to this, his manure is greater in quantity and better in quality. I conclude what I have to say on this subject with a single remark. Let your negro-houses be warm and comfortable.

But I hasten to that which I consider still more important in a well managed farm. Such an establishment will regularly produce large crops, and so far from being exhausted, will be maintained in a state to produce still larger.

will be kept in a state of continual improvement—and herein consists, as I think, the whole art of good farming. And now, the all important question presents itself—how is this very desirable state of things to be effected? I am fully aware, that I am now approaching one of the most complicated and difficult questions in agriculture; and I acknowledge that I touch it with great diffidence. If there be any point connected with my vocation, on which I have read, and thought, and studied and sought information, with more intentness, than any other, it is this vexed point. All will agree, that to the continual improvement of our lands, large additions of manure of some kinds are indispensably necessary. But the difficulty is—what kinds are most available—calcareous, or that large class which are generally called putrescent manures? And then what is the most suitable time for their application, in winter, when the ground is naked, or to the growing crops? And *how* are they to be applied, as a top-dressing or immediately to be covered with the plough? After worrying and vexing myself with these and many other points connected with manuring, I have concluded to dispose of the whole affair in the following summary way—take such manures as you can get, and apply them at such time and in such manner as you may find most convenient, and I have never seen any lands but would be benefited by the process. If, however, I were to recommend one mode above another, it would be, to top-dress the grass lands, and the next year or the year following, to submit the same fields to a corn crop. Good farming then mainly resolves itself into this one thing—to possess yourself every year, of a large amount of valuable manure; and if this be all, I have no doubt that every one now present *feels* that he can be a good farmer. Among the many anecdotes which are told of the celebrated John Randolph, of Roanoke, I have heard this as one—that whilst a member of the United States Senate and actually delivering one of his eccentric speeches, he suddenly paused, and fixing his burning eye upon the presiding officer of that body, he exclaimed—"Mr. President, I have discovered the philosopher's stone—it consists in four short words—*pay as you go.*" I think I have made the same discovery. It consists in making, every year, a large pile of manure, in distributing it in the proper season over our fields, and then, in a course of neat, careful, and diligent culture. It follows, therefore, that the philosopher's stone is no longer a fiction, existing only in the brains of deluded alchymists. John Randolph discovered it in the Senate of the United States; and from traces I have seen I verily believe that it lies concealed somewhere close by my farm pen, my stables, and my hog sties. And the beauty of the thing is, that it is not confined to any particular locality. If you look for it, I doubt not, you will find it in the immediate vicinity of your farm pen also. Yes! the farmer, the judicious farmer has at last discovered the long sought-for, the renowned philosopher's stone, the magic touch of which changes every thing into gold!

The great mischief, among us farmers, is that we are in too great a hurry to get rich. We seem to forget, that the golden age has passed by, and that we are living under the hard influence of the iron age. We greatly mistake too, as I think, as to that in which our true riches consist. One man considers himself rich, because he has a large sum of money to lend out at a usurious interest, and thus takes advantage of the distresses of the times. Another is accounted rich, because he owns a large amount of stocks in some moneyed institutions. But the farmer's wealth consists, not in his stocks, not in his houses, *but in his rich lands.* I recollect that when I began farming, an old friend and acquaintance, Mr. John Carter, gave me a piece of very valuable advice—"make your lands rich," said he, "and in proportion as they become rich, *you* will be rich." The old man spoke the truth. The Bible tells us that man was made out of the dust of the earth. This is true of all; but the farmer is identified, in a peculiar manner, with the ground that he cultivates. When that is poor, he is poor, and when that is rich, he is rich too.

I have also known many farmers to be seriously injured, and some of them ruined, by indulging in a spirit of speculation. They contrive to get hold of a few hundred dollars, (honestly I hope,) and instead of first paying their debts, and then laying out the balance in manures and other things by which they might improve their farms, they go away and lay it out in bank stock, or gold mine stock, or in some other humbug foolery of the same kind. Presently stock fluctuates and the gold mine prospects are blown sky high, and the poor man's capital vanishes into smoke.

I hope it will not be ascribed to vanity in me, but I cannot refrain from detailing an incident which actually occurred in my own case a few years since. During the rage for gold mine speculations I was visited by a substantial and highly valued friend of a neighboring county. He came to me in my corn field. At that time the plants were about a foot high, and I was busily engaged with my hoe in helping up the hindmost hand with his row. He looked at me with a degree of surprise, and I doubt not felt a real compassion for me. At length said he, after the usual salutation, why toil here in this dull, slow way? And taking from his pocket some beautiful specimens of virgin gold, he exhibited them in all the conscious pride of superior intellect. This treasure, continued he, is found in a mine which I am now working to very great profit, and I advise you to abandon this dull pursuit and embark in the same enterprise. The dazzling spectacle had, I confess, its effect upon me; and to cover my mortification I replied, I too am digging for gold, but with this difference—you go to the depth of many feet, I to the depth of a few inches—and the event has proved, gentlemen, that more gold is to be obtained near the surface than far below it.

And here, perhaps, I ought to close my address, but there are still a few circumstances connected with the character of the good manager, to which I think it important to call your attention. And first, our farmer is a man of strict economy in the proper acceptation of that term: not that he is stingy or niggardly in his disposition, but he so contrives to manage his affairs, that every thing has a plenty and nothing is wasted. The best story I ever read was written by Miss Edgeworth, and is entited "Waste

not, want not."' It is essential then to good management to waste nothing, not even a crust of bread, for the dog will eat it, or if he happen to be a pampered favorite, the hog will eat it. And here I can at last reverse my text, and say in confidence, do as I do. If there be any thing which I do most cordially abominate, it is that of wanton waste. I can say in truth, that I waste nothing, not even a weed, for when placed in my great manure workshop, my hogs and cattle very soon manufacture it into a valuable article. Above all, our good manager is a great economist in his use of time. He believes, with Dr. Franklin, that "time is money," and in his estimation it is a coin of inestimable value. It is, therefore, his habit to rise early, and to get a good start at his business in the morning, for this he finds will make his work light during the whole day. Not even a *rainy* day is lost by him; for now he shells corn and beats hominy, and thrashes out his peas, and makes brooms and footmats, for which the good wife will thank him; and puts a new handle to his hoe and axe; and mends and oils his old harness, by which they will last twice as long; and does a great many other jobs, which good management will readily dictate. It is, therefore, needless to remark, that you never see this man loitering about the court house, or the muster field, or other places of public resort, unless he has business there. On the contrary, it is his habit to stay at home and do his duty there, unless business calls him away. But whilst I record my testimony against all waste, I would by no means recommend the contrary extreme. Some people here, in endeavoring to avoid Scylla, fall on Charybdis, and are equally certain of being engulfed. Whilst, therefore, they studiously avoid all waste, they practise the stinting or even starving system at home. This, of all economy, I consider the worst. The fact is, that no man ought to keep an animal unless he can keep it well. If food is too scarce to feed the hog, the proper remedy is to send him to the butcher, and when you can no longer feed your horse or cow, don't turn them out upon the common to starve, but send them to market.

Some time ago, in visiting a friend and neighbor, whom I highly esteem, my attention was called to his hogs. They looked well, (for my friend is a good manager,) but I thought they would look still better, if they had a little more corn, and ventured to suggest this to him. Corn is scarce, was his ready reply. That may be, said I, but if you proceed on this plan, meat will be still scarcer. Besides, continued I, the hog when he eats, don't eat for *himself*, he eats for *you*—he don't *waste* your corn--he just turns it into meat, and this you know, is a very useful article in your family. The idea seemed to strike him as a new one, and whether it is owing to this little incident or to some other cause, the fact is, that my friend's stock of hogs has since that been celebrated as the finest in all the neighborhood. A little anecdote occurs here, which I beg leave to relate. Cuffee came in on a very cold day almost frozen, and that he might enjoy the full comfort of the fire, placed himself very near to it. His friend, Sambo, presently observed his foot smoking. Cuffee, said he, your foot is burning! Taint *my* foot, you fool you—he *massa* foot. From this, some of you may think Cuffee a fool--but he was very far from it. He went on the same principle that other philosophers do, that the *whole* includes its *parts*, and that, therefore, as *he* was his master's property so was his *foot*. When, therefore, I see my hog eat, I find no fault with him—he eats for me.

Again—our good manager is a man of *reading*. And here permit me to remark, that we, of the present day, ought to be far better farmers than our grandfathers were. They had no Ruffin of the Farmers' Register, nor Skinner of the American Farmer, nor Buel of the Cultivator, nor Botts of the Southern Planter, to tell them of the immense improvements in the farming world. The floods of light, which we now enjoy were all darkness to them. I would not be without my agricultural periodicals for ten times their cost. I scarcely ever receive a number, but I consider it worth more than the price of the whole series. Go then and subscribe for at least one of these works. Take one, and my word for it, in less than six months you will feel that you must have another. The great benefits arising from the one, will enable you to pay for the whole.

Further, our good manager is a man of *observation*. His duties and his pleasure call him frequently to his fields, and whilst there, he keeps both eyes wide open, watching the results of the various processes in which he is engaged; and there is no variety in manuring, or difference in the mode of culture, but he marks it, and is ready to profit by any superiority which one plan has over another. And, lastly, his reading and observation combined, make him a man of thinking. You see, then, the compound which I have endeavored to present—economy, industry, reading, observation, reflection; and when you see all these concentrated in the same individual, you may set that man down as a good manager.

You now have, gentlemen, a sketch, and, I confess, a very imperfect one, of what I conceive to be a well managed, a well cultivated farm. But defective as it is, suppose its counterpart could be found in any one case? Suppose that this scene covered the limits of our whole society? Suppose that all our farms were tastefully and judiciously divided into their several fields, and that every field was so enriched and so cultivated as to produce an abundant crop? Suppose that all our enclosures were neat, and straight, and substantial? Suppose that all the buildings, as well for the servant as for the master, together with the shelters for the brutes, were so constructed and kept in such order as to make all comfortable? Suppose that neatness, and industry, and economy, and good order pervaded our whole limits, and that in all these respects, there was a manifest improvement from year to year? What might we not say in regard to it? Might we not exclaim, with the Bible, "Happy is that people that is in such a case?" But suppose we allow our fancy to take a more extensive flight, and instead of confining this goodly prospect to a single county, you allow it to cover the whole of our beloved mother state; how beautiful the sight? how lovely the picture?

And may not all this be realized? I answer with confidence that it may—and I hereby pledge

myself, that, if God please to spare my life, I will use my best endeavors, year after year, to bring my farm to this state of things. Brethren of the Agricultural and Horticultural Society of Henrico County, will not you pledge me to the same? Then the work is in a great measure done. If each individual will act, the whole mass must necessarily be moved.

I close with one more remark. Citizens of Richmond, who are no farmers, but who are deeply interested in the events of this day. You see the objects of this society—it is to make our country smile with beauty—it is to make it teem with plenty and abundance—it is to elevate the character of our farmers, and to make them, in all instances, intelligent and useful members of society. Will *you* not come forward and aid us in this good work?

HOW DOES CLIMATE AFFECT THE STAPLE OF WOOL?

From the Farmers' Monthly Visitor.

Hopkinton, N. H., Aug. 1st, 1840.

Hon. Isaac Hill.—In the Visitor of yesterday, now before me, I find a very interesting account of Col. Jaques, his farm, and his stock—but more especially interesting is the account of the management of his stock, and his theory for its improvement. I will touch only upon his theory respecting his flock of South Downs. He states, that "to give them the finer and uniform quality of wool down to the fetlock, and an increased quantity over the whole body, he had so disposed of their breeding that they should present their lambs in the fall, instead of the spring." He founds the improvement of the wool of his sheep on the principle, "that the economy and providence of nature are such, that animals clothed in wool or fur will increase or diminish the quantity of either, according to the climate, which requires more or less wool or fur to warm the body."

It is on this same principle of the "economy and providence of nature," that I found the improvement of the wool of my sheep; but my manner of doing it is the reverse of that of Col. Jaques. If my views are right, they may be of some service to wool growers, who would be likely to follow a principle laid down and reduced to practice by a person of so much influence as Col. Jaques. My reasons for adopting a different manner of improvement, may be seen in the following account.

In the fall of 1821, I bought a small number of full-blooded Merino sheep, for the purpose of increasing my flock and raising fine wool. For a number of years I allowed the buck to go with the flock the year round, in order that my lambs should come in the winter, supposing birth at that season would have a natural influence in producing a more abundant quantity, and a much finer quality of wool. In breeding in this way, with the nicest care as to male parentage, I found all my young sheep bore wool of an inferior quality to my original stock. I had nearly made up my mind that our country was not suited to the growth of fine wool, and that in the course of time the offspring of fine Spanish sheep would become assimilated to, and lost in, our native breed. From conversation and reflection on the subject, I concluded to change my course, and let the month of May be the yeaning month, and a few years only were needed to produce a change for the better, as apparent as day from night. All agree that a cold climate is calculated to produce a finer, softer and more abundant covering for the animal creation, than a hot one; and for that reason a lamb that is dropped in May, or the fore part of June, will produce more and better wool than one which comes in the fall or winter. By allowing the male to go to the female in December, we have the whole of the winter for the formation of the animal, and with all the other parts, every fibre of the wool is formed, and the lamb is fitted for a cold climate with a fleece of the finest and warmest kind. After the perfect formation and production of the animal, the heat of our summer produces no change in the quality of the wool, or if any, it is so slight as to be wholly unperceived. Sheep that are at all times kept in a perfectly healthy condition, continue to produce wool equally fine, soft and beautiful, year after year, till visited by old age, and then, like the hair of an aged person, it becomes in some degree more harsh and rigid. By providing for the birth of lambs in the fall, gestation is going on during the heat of summer, and nature, true to her work, prepares the lamb with a hairy, coarse covering suited to a warm climate. STEPHEN SIBLEY.

THE CURCULIO.

From the New Genesee Farmer.

We are but partially acquainted with the curculio. Its manner of providing for its young by depositing the nit in our stone fruit, may be familiar to most of our readers,—together with several other particulars: but its food after it has passed into the perfect state, its place of abode during the autumn and winter, and the age it may attain, are things which appear to be very imperfectly known.

If the life of this insect extends to several years, the chief advantage to be derived from having hogs and geese under the trees, must be to prevent its increase. A few of the old ones, indeed, may be trampled to death; but in a large fruit garden, it is likely that most of the young ones will escape; and if to these we add such as immigrate from other places, there will be an increasing array of them in the trees, beyond the reach of the hogs, geese, and poultry.

That such has been the case in our fruit garden, we are much inclined to believe. Six years ago, the hogs were not permitted to run there: and without doubt many hundreds of young curculios were added to those already in possession. We have lately undertaken to lessen their number by catching them on sheets; and we now have about 1700 on the list.

From their difference in size, we infer a difference in age. Further proof, indeed, is wanted; but some of them are not less than four or five times as large as others. If they live through a period of years, they must continue to provide for their offspring in some kind of stone fruit. If we exclude them from the plum tree, the apricot, and nectarine, they will attack the peach and the

cherry. The latter indeed suffers annually to some extent; and a few years ago, owing to a scarcity of other fruit, our peaches were almost entirely destroyed by them.

These considerations have induced us this season to pay more attention to them than in years past; and we have been surprised to find them so numerous. In a late article on this subject, we proposed to jar the trees before the tin troughs were put up; but one, or even a dozen jarrings are not sufficient to get them all down. The troughs, therefore, should be fixed and filled, very early in the season, before the insects ascend the trees, or the labor may be vain. We offer some proof of this remark: For nine mornings in succession, some of our trees had been repeatedly struck with an axe, so as to produce violent concussions, each time obtaining a goodly number of curculios; and yet on the tenth morning, from the same trees, we caught more than double the number that we had at any other time, owing to the cold which benumbed them, and rendered them less able to hold on. From the same trees we have since obtained many more.

Some persons have doubted the efficiency of water troughs; but from what we have seen of them, our confidence has not been diminished in the least. We have frequently caught curculios on the rim, as if waiting for a passage; and have sometimes found them in the water perfectly helpless. Now to prevent them from climbing up, is all that we can reasonably expect from a water trough. It cannot bring them down.

For large trees, the expense of these fixtures will be greater than on small trees, the amount of materials to make them being greater. If a sufficient space be left between the trough and the tree, however, it may remain several years without being taken down—a hole being made in the bottom as soon as the curculio season is over, to let off the water which might collect there, from rain or from melting snow. A small chisel, cutting through the tin into a block of wood held firmly under, would make a sufficient aperture, which might be closed the next spring, and secured by a drop of solder. Three or more wedges pushed up between the trough and the tree fastened by small nails, support the trough: and rags or tow stop up the remaining vacancy. We cap the whole with a coat of mortar to prevent the insects from working their way through the crevices.

Hogs sometimes neglect to eat the fallen fruit when it is very green; but shorter commons will generally bring them to their duty. If the fruit lies long under the tree, the worm escapes into the ground.

SHELL MARL UNDER PEAT, IN VERMONT.

To the Editor of the Farmers' Register.

Woodstock, Vermont, March 6, 1841.

* * * Our marl I think is very different from that with which your experiments were made, containing probably a greater per cent. of lime. It lies in the bottom of a "lime pond" of about fifteen acres in extent, and varies in depth from two to twelve feet and upwards, and is covered with a layer of peat from two to seven feet in thickness, with the exception of a pond covering about three acres, which is supplied in part with water by springs in the bottom, and partly by small streams in the edge of the meadow, which can be conducted off by ditches.

A great portion of the mass is reduced to an impalpable powder, containing apparently much animal matter; and when wet has a very oleaginous feeling. The few shells, whose forms are discernible, are very small, and completely friable; they are very free from any admixture of earth or other foreign substance, and are of a very white color. The deposite consists principally of snail shells, intermixed with a few bivalvular shells, rarely as large as a kidney bean.

It has not been used for agricultural purposes, but has been burned for lime, which was of a very superior quality. CHARLES MARSH, JR.

SHEEP POISONED BY THE COMMON RED CHERRY.

From the New Genesee Farmer.

Messrs. Editors—Some six or eight years since, while carrying on farming at Rock Stream, one of my orchards, in which was a variety of fruit trees, including a number of the common red sour cherry, became covered with a luxuriant growth of grass, to destroy which, I turned in, about the first of September, fifty or sixty Merino sheep. The animals seemed unusually fond of eating the young cherry sprouts which had sprung up very thick under and about the cherry trees. In less than an hour a large proportion of them were discovered to be diseased, and they were immediately turned out. They staggered continually, pitching forward upon their heads, and often turning entirely over upon their backs. In the course of two or three hours several of them had died; the remainder gradually recovered.

Post mortem examinations proved that their stomachs were compactly filled with the leaves of the cherry sprouts, containing, I presume, prussic acid sufficient to destroy animal life.

E. BARNES.

Note—A neighbor of mine lost a cow from her eating the leaves of a cherry tree, which had been blown down by a wind storm. E. B.

Geneva, May 29, 1841.

MISTAKES OF THE NAMES AND CHARACTERS OF GRASSES.

To the Editor of the Farmers' Register.

West-Chester, Pa., July 5, 1841.

I have to acknowledge the receipt of some additional numbers of the Farmers' Register, for which you will please accept my thanks. I am much pleased to observe the spirit of inquiry which you have roused among the farmers and planters, in reference to the various grasses in which they are interested, and particularly the desire manifested to ascertain more accurately the *identity* of the several species of which they treat in their communications. This is certainly the first step towards a useful discussion, and the only way to arrive at satisfactory conclusions. It is worse than labor lost, and leads to endless confu-

sion, to be arguing the merits or demerits of plants under *popular local names*, without knowing whether we mean the *same thing*, and when, in fact, the parties, (as is often the case,) are treating of entirely distinct species. I am led to these remarks, which have been substantially made on a former occasion, and cannot be too often repeated, by observing, in your *May* number, page 295, a misapprehension which originated in the very evil alluded to—namely, the use of local popular names. In my communication to the 'American Farmer,' of the 8th February, republished in your February number, page 114, I mentioned that our blue grass (*poa compressa, L.*) is often called "*wire grass*" in this district; and I supposed it might be known by the same name in Virginia. You, however, corrected that error, and showed that the "wire grass," of *Virginia*, is the *triticum repens, L.*, or "couch grass," of the English. This "couch grass" is not much known in Pennsylvania; and hence I was led into the mistaken supposition that it might be rare, also, in Virginia; and that the name of "wire grass" might be applied, *there*, to the poa compressa, as it often is *here*. A correspondent, in your May number, who signs "J. D." seems to think that I referred to *your* "wire grass," (*triticum repens, L.,*) and that I supposed it to be the same as *our* "wire grass" (*poa compressa, L.*) Now, I was only misled by the local, *common name;* and it is that error which I wish to correct. I am well acquainted with both grasses; and never dreamt, for a moment, of confounding our Pennsylvania blue grass (*poa compressa, L.*) with the *triticum repens*, or "couch-grass," which, it now appears, is the "wire grass" of Virginia. They are entirely distinct plants: and I hope that, hereafter, there will be no danger of any further confusion between them, among the readers of your highly respectable journal. This little explanation is another evidence of the importance of *calling things by their right names*, and of understanding exactly what it is we are talking about, in our discussions.

While on this subject, I may as well add, that the valuable *poa pratensis, L.*, or smooth meadow grass, is sometimes confounded with another species, nearly allied to it, called by the botanists *poa trivialis*. Thus, in the Kentucky Farmer of June 5, Mr. John Lewis, in an interesting description of the "Kentucky blue grass," says it is "by some called *poa pratensis*, by others *P. trivialis*." These are distinct species; though much resembling each other. The *P. pratensis* is quite *smooth*, however; and the little skinny membrane, at the top of the sheath, or base of the leaf-blade, called the *ligule*, is *short* and *obtuse;* while the stalk and sheaths of *P. trivialis* are sensibly *rough*, and the ligule *elongated*, and tapering to an *acute point*. These characters are constant; and, on comparison, will serve readily to distinguish the two species. They often grow together; though the *P. trivialis* is more usually found in moist situations. They are both much esteemed in Europe; but, with us, I think the *P. pratensis* decidedly the more valuable of the two. English writers speak often of another poa, which they call *P. angustifolia;* but it is scarcely distinguishable from *P. pratensis;* and is in fact considered, by the best botanists, as nothing more than a *variety* of that species. So, likewise, in our own country, we sometimes see the *Poa viridis* mentioned, which is only a luxuriant state of the same *P. pratensis*, and is often called "green grass."

I trust you and your readers will excuse these hasty remarks. They are merely offered with a view to aid in clearing up some little obscurities which occur in the essays of our agricultural writers. A little attention to these matters, on the part of essayists, will soon remove the difficulties now existing, and render all plain and intelligible. WM. DARLINGTON.

COTTON AND CORN. A DIALOGUE.

From the Liverpool Mercury.

The following clever lines, by Mr. Thomas Moore, are so peculiarly appropriate at this crisis, that, although we believe they have already appeared twice in the Mercury, we shall offer no apology for their repetition:—

Said COTTON to CORN, t'other day,
As they met and exchanged a salute—
(Squire CORN in his cabriolet,
Poor COTTON, half famish'd, on foot:)
"Great Squire, if it isn't uncivil
To hint at starvation before you,
Look down on a hungry poor devil,
And give him some BREAD, I implore you!"

Quoth CORN, then, in answer to COTTON,
Perceiving he meant to make free,
"LOW FELLOW, you've surely forgotten
The distance between you and me!
To expect that we, Peers of high birth,
Should waste our illustrious acres,
For no other purpose on earth
Than to FATTEN CURSED CALICO MAKERS!

"That bishops to bobbins should bend,
Should stoop from their benches' sublimity!
What! SPINNERS and WEAVERS befriend,
CONTEMPTIBLE DEALERS in dimity?
No; VILE MANUFACTURER, ne'er harbor
A hope to be FED AT OUR BOARDS;
Base offspring of ARKWRIGHT the barber,
What CLAIM can you have upon LORDS?

"No; thanks to the taxes and debt,
And the triumph of paper o'er guineas,
Our race of Lord Jemmies as yet,
May defy your whole rabble of JENNIES!"
So saying, whip, crack, and away,
Went CORN in his CAB through the throng,
So madly, I heard them all say,
Squire CORN would be DOWN before long.

A SUBSTITUTE SUGGESTED FOR GREEN CROPS FOR TURNING DOWN.

From the Farmers' Cabinet.

Mr. Editor—We hear much of sowing crops for the purpose of ploughing them down while green. Did it ever occur to the minds of our farmers how many and what heavy "green crops" may be cut from their rushy bottoms, their ditches, their woods,; but, above all, from the margins of their rivers and creeks; and which, if buried in the bottom of their furrows, would ferment and become as valuable manure as any that could be grown for the pur-

pose at the expense of ploughing and sowing, and which would enable them to mow these for their cattle, and thus obtain from them an addition to their cattle keep, instead of robbing them of so many acres of fodder? There is upon record an account of an experiment on growing potatoes, when it was found that a single cabbage-leaf laid on every set of the potatoes while planting, produced as large a crop as was taken from the rows dressed with stable manure. Then what would be the result of a thick covering of water-lilies, reeds, or the rushes and weeds from our boggy bottoms? I am at present a *slave* in a dry-goods store in Market street, but shall be free in the spring, when I will ascertain if *agriculture* will not pay for capital expended, as well as *trade*. J. D.

Philadelphia, June 20, 1841.

ON TOP-DRESSING.

From the Farmers' Cabinet.

Mr. Editor,—When I first read the article at page 84 of the present volume of the Cabinet, on top-dressing, I thought, indeed, that it was all *theori*, as my friend and neighbor Parnell calls it, and was astonished that any one could advocate a doctrine so foreign to all our past experience, and in the very teeth of every work on agriculture, all of which inculcate the absolute necessity of keeping our dunghills covered with earth, to prevent the escape of the gases, and the loss of about one-half the value of the manure; and upon spreading, to turn it in immediately, for the same best of all reasons; and, as I say, I did heartily despise the notion of top-dressing, much as your correspondent A. had to say in its behalf. This was in the autumn of last year, and up to February of the present spring, I had not changed one jot of my opinion or lost an atom of my prejudice; but, turning again by chance to the article, as I sat by the fire-side one cold and comfortless evening, when I had leisure to examine and reflect upon what he had advanced five months before, a thought struck me, that I could try for myself the truth or error of the scheme, and that I ought to do so, for the benefit of those who had it not in their power to make the experiment so easily as I could; and I therefore came to the resolution to give the thing a fair trial and report upon it in the Cabinet, which I am now prepared to do.

In the upper part of one of my fields I have a gravelly bank with scarcely two inches of mould upon it; there the crop, of whatever kind, had always been poor, even after the most careful cultivation—the hungry subsoil permitting whatever dressing was buried in it, quickly to pass away: I therefore ploughed it as deep as I was able, and immediately sowed upon it a portion of oats; I planted Lima beans on another portion as also some of the emur, mentioned in the late pages of the Cabinet, and immediately covered the surface with the sweepings of the streets, to the thickness of an inch or an inch and a half, and "said nothing to nobody," as I was fearful my neighbors would have enjoyed a laugh at my expense, had they seen me expose a coat of manure "to be dissipated by the winds of heaven," &c. This was late in the month of April, and on this, the 20th day of June, I find upon this hitherto worthless portion of my land, crops that far surpass any that I have ever grown on land of ten times its value, and which have borne the late drought without flinching in the least. On turning up the dung, I find the earth underneath always moist—it seems to operate as a sponge, to hold the evaporation which rises from the subsoil, and to prevent its escape; and the weeds which were indigenous to the soil, appear not to have vegetated, but are kept in abeyance by the heavy crops with which the ground is covered. I need not say that I visit very often my experimental plot, and am more and more convinced of the superior value of top-dressing, on such soils at least, and am free to confess that my mind is now open to conviction. On the most careful examination, I cannot perceive that the coat of manure is at all lessened in bulk by either the rains or exposure; but I *can* perceive that a shower, which carries the water impregnated with the dung to the roots of the plants, causes them to start away in a most remarkable manner—indeed the immediate effect is surprising. I am, therefore, so far as the present experiment has taught me, convinced of the great advantage of top-dressing: will others try it? I am preparing to sow beet after rye, and shall cover the rows where the seeds are sown, with well-rotted street manure as a top-dressing, instead of burying it in the rows, as heretofore directed, and have no fear of obtaining a good crop. JOHN KINSON.

COWS, BEFORE AND AFTER CALVING.

From the New England Farmer.

My father's practice until last autumn was to feed his cows for a short time before calving higher than they had previously been fed in order to have their bags well filled at the time of calving, when it was his practice also to give them warm water thickened with meal. The consequence was, this extra feeding caused the udder to fill too soon, and the milk continuing to press in, produced inflammation, and the cows were much troubled with hard and swollen bags. Observing this I last spring requested my father to try an experiment on a cow that the year before had given us much trouble, by *reducing* the quality of her food, instead of *increasing* it, and the result was, she calved before her bag was full. At first she gave but little milk, but in a short time her milk increased, and the udder remained soft and pliant. We have had no trouble on this score since, except with a heifer which calved about the first of July, when the grass was abundant; and this would probably have been prevented, had she been fed at the barn for eight or ten days with hay before calving, and she would then have been saved much pain, and we much trouble.

This subject has received put little consideration; but who can tell what effect one week of pain and suffering, arising from an inflamed udder, might have upon the health of the cow, and the quantity and quality of the milk during her whole life after?

CARRIER PIGEONS.

From the Farmers' Cabinet.

On the 12th day of the 6th month, (June,) 1841, R. Bison, son of Evan Bison, of Gwynedd township, Montgomery county, Pennsylvania, about 21 miles N. W. of Philadelphia, sold a pair of common tame pigeons in the Philadelphia market, to a person who was a stranger to him; six days after, one of them returned to its former owner, and on the following morning, the other returned also; and they are now, the 20th of 6th month, (June,) enjoying their old place of residence, very lovingly, 21 miles from the city. During their absence, another pair took possession of their cote, and the first employment they engaged in after their return, was to oust the interlopers, and repossess themselves of their domicil; which they effected much sooner, and at less cost than a lawyer would accomplish a similar business; and they are now in the quiet, peaceable enjoyment of the premises, without, as yet, any appearance of an appeal to a higher tribunal.

Should the purchaser see this article, he can repossess himself of his property, by a call at the pigeon cote, above stated, *without* paying for this advertisement, or being at the trouble or expense of an action of trover.

The following extract from a foreign publication is appended, to show that the carrier, or express pigeon, performs feats far surpassing the above; though it is very remarkable that the *common tame pigeon* should find its way for such a distance unaided by instruction.

Expresses.—"The modern system of *pigeon expresses* possesses an extraordinary interest, as well on account of its rapid means of communicating the most important events as of the curious and laborious mode by which it is set in operation. The birds, by far the most valuable for this purpose, are of the Antwerp breed; although it is not uncommon to train the English pigeons, called dragoons, to carry expresses.

They are trained when very young, or, as they are technically called, *squeakers*, to fly between different towns and villages, commencing first at a space of only a few hundred yards, and so on, gradually increasing, until they accomplish the required distance. They are usually trained to fly to intermediate stations, between Dover and London, at which they are succeeded by other relays, but fly, in many instances, the whole distance from other places. The number lost in training is immense. This trade is principally in the hands of the Jews, and the emoluments arising therefrom are very considerable.

There are a few instances in which capitalists and others having extensive moneyed and mercantile operations throughout Europe, maintain an establishment of their own, amongst whom is the Baron Rothschild, who, at Dover, rears and trains his own flight of pigeons expresses, with connecting branches throughout Germany, and others parts of the continent.* The establishment at Dover consists of about 400 birds, with a keeper, whose wages are 35 shillings a week.

The expense of feeding the birds is considerable, as much as 25 shillings a week being consumed at Dover, in beans alone, whilst the entire collection is supposed to have cost at least £2000 sterling. The express is sometimes tied to the middle feather of the tail, by passing a thread with a needle through the stem, but more commonly attached to the leg immediately above the spur. The rapidity of these important expresses may be estimated by the following information obtained from a trainer and proprietor. His pigeons have arrived in London with the news of the winner of the Ascot cup, in fifteen minutes;—from New Market,† in sixty minutes; and from Chichester,‡ bringing the winner of the Goodwood cup, in one hour and fifteen minutes.

At the Ascot races, last year, her Majesty having expressed a wish to see one of these beautiful birds, a carrier pigeon was flown, in her Majesty's presence, from the royal stand, and, to the great delight of the spectators, after indulging in sundry gyrations, darted onwards with its winged intelligence to the metropolis." R.

June 30, 1841.

For the Farmers' Register.

THE BOARD OF AGRICULTURE.

To the Gentlemen lately appointed members of the Virginia Board of Agriculture.

Without doubt you have read, (as I have,) the law under which your appointment has been made. But being utterly at a loss myself to determine what is best to be done, I must ask permission of our friend, Mr. Ruffin, who is "one of us,"—thus, publicly to consult you on the subject, and to solicit a brief expression of your opinions through the Register.

The preamble of the law states very truly, "*That the agricultural community have various interests, requiring the fostering care of the state, which should be extended to them according to some system approved by observation, and regulated by experience.*" And the system which the beneficent guardians of these interests have thought proper to adopt is—to require of eight individuals the discharge of more numerous, diversified, and arduous duties than ten times that number of the oldest, most skilful and talanted planters and farmers in Virginia could possibly execute, without a

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* It may not be unnecessary to state that the object of these pigeon expresses, is to obtain the earliest news of changes of the money market, in aid of stock-jobbing operations.—Ed. F. R.

† New Market, 60 miles.

‡ Chichester, 65 miles.

previous agricultural survey of our whole state being made by some one or more of their own body. All these duties too are required to be performed at their own expense, as if the honor alone of being a member of *the Virginia Board of Agriculture* were quite sufficient compensation! Now if there be any similar "*system approved by observation and regulated by experience*," known to any one of you, I will take it as a special favor, if you will publish it; for I myself have never heard of any feat of legislation at all like this act.

Again, admitting that the honor alone be all-sufficient to satisfy those who are most ambitious of such distinction, I would respectfully ask you to say—if you decide upon accepting this honor—how the third enactment is to be executed? It runs thus. "And be it further enacted, that it shall be the duty of the said board to hold one session in each year, at such time and place as may be fixed upon by the board, with the consent of the executive."

Hence it seems that you are not at liberty even to meet, nor to choose either the time nor place of meeting, without first asking permission of the governor and his council, although any man of common sense would probably think that it would puzzle not only the executive, but the most sapient of the framers of this extraordinary law to point out how this executive consent is to be obtained without a previous and unauthorized meeting of the board—the said law having omitted to fix on any time or place for the first meeting. According to my simple understanding, this last enactment completely nullifies the two which precede it; and unless it has some meaning, entirely different from any that I can discern, must render this precious specimen of "*the fostering care of the state of Virginia* over the "*various interests of her agricultural community*," a subject of universal and well-merited ridicule throughout the United States.

But can nothing be done to remedy the errors, —may I not say the absurdities and injustice of this law as it now stands? Might not the members of the board, if willing to act provided the law can be amended, take upon themselves the responsibility of holding a meeting, say in the city of Richmond, for the purpose of memorializing the next legislature? If you approve of this proposal, I will take the liberty to name October next as the time, and on the first day of the next show and fair of the Henrico Agricultural and Horticultural Society. Such members as could not attend might forward, by some friend, letters expressive of their wishes in regard to the course they desired to be pursued, and thus no time would be lost in attempting to accomplish an object alike demanded by the crying wants of Virginia husbandry and the united voice of all its best friends. ONE OF YOUR OWN BODY.

June 26th, 1841.

P. S. Should the time and place of meeting not suit the majority, how shall one more convenient be fixed upon? Four or five years have already been lost, since a bill to establish a Board of Agriculture was first proposed in our legislature, and surely that inexcusable and shameful withholding for such a long period of "*the fostering care of the state, for the various interests of the agricultural community requiring*" that care, as the last legislature themselves have acknowledged, ought to satisfy the most inveterate procrastinator among us. Our law-makers have been (if my memory is correct) most diligently engaged, ever since 1798—to the great amusement of most of the other states—in abortive attempts to regulate the affairs of the general government, instead of laboring constantly, as their duty required, to promote the interests of their own state; and the fatal consequence has been, that poor old Virginia has been sinking in character and relative influence ever since. Will the cultivators of the soil who certainly have the power to remedy this crying evil, never apply it? All that is necessary for the purpose would be to choose for a few years only, a set of legislators who would attend to their own business, and cease to occupy almost their whole time, with matters over which they have no power whatever.

[We think that the members of the Board of Agriculture cannot do better than to act upon the suggestion of our correspondent, and hold an informal preliminary meeting.—ED. F. R.]

BALDWIN'S PATENT STOCK MILL OR CORN AND COB CRUSHER.

The machine described in the following article (by the editor of the Kentucky Farmer,) is the invention of a native and resident of Rockbridge county, Virginia. We have heard it well spoken of elsewhere.—ED. F. R.

From the Kentucky Farmer.

We beg attention to an advertisement in our columns this week, of a machine to grind corn and cob together. One of these machines has been put in our hands for trial. We attached it to a small drum which gave it about half speed, by which motion it ground up the grain and cob in the most effectual manner, rendering them into a meal rather finer than the hommony we use on our tables. Not a single grain escapes being thoroughly cracked and crushed. There is no dispute in the country as to the economy of feeding stock with ground food; the only question is as to the economy and efficiency of the means used for grinding. Of this machine, though we have an instinctive distrust of such things without trial, we have a favorable opinion, from the small experiment already made with it. It requires a one or two horse power to propel it, and grinds out about ten bushels an hour. It is made in the most durable manner of the best materials, all the most important parts being of cast iron. As those desiring such a machine are invited to examine this in operation, it is not deemed necessary to make a detailed description of it. It is not, however, at all after the fashion of the ordinary bark mill crushers. Its crushing power consists of two pairs of fluted cylinders of hardened cast iron, one pair of which roll upon a cast iron fluted concave. It does the whole business of crushing and grinding the grain and cob at one operation, a great advantage over those machines which only crack the grain and cob to be afterwards ground by another operation.

We think this machine one promising great advantages to those engaged in feeding stock; and we feel the more willing to recommend it as it is warranted, and those not liking it on a fair trial are at liberty to return it. The price $85 to $110.

ON THE WAX PROCURED FROM SUGAR CANES. BY M. AVEQUIN, DRUGGIST AT NEW ORLEANS.

To the Editor of the Farmers' Register.

Patent Office, July 1, 1841.

The day after your departure from the city, I received my periodicals from France, and among the interesting articles contained in them, noticed one upon the subject of vegetable wax, or "cérosie." I send you a translation, regretting I could not, while you were here, give you some better account of the process by which this new compound is obtained.

The inventor represents the wax as superior to spermaceti, and at the same time much cheaper.

Yours, respectfully, H. L. ELLSWORTH.

[Translated from L'Echo du Monde Savant. Paris.]

The sugar-cane, like many other plants, exudes a substance resembling wax, to which the name of vegetable wax has been given.

This matter presents itself under the form of a white powder, adhering to the bark, and may be very easily detached from it, by scraping with the blade of a knife, or any other cutting instrument. In order to purify it, maceration in cold alcohol is employed, at 35° or 36°, by which means it is separated from the "*chlorophylle*" with which it is mixed. It is insoluble in water, but soluble in boiling ether, from which it is deposited in cooling, under the form of grained crystals; it melts at 82°, and solidifies, at 80°, into a crystalline mass; its density is 0.961 to 10; it is without odor, and combines easily with the alkalies. To procure this substance, to which the discoverer has given the name of "*cérosie,*" the process by scraping would be too lengthy, and not sufficiently economical, M. Avequin proposes to substitute the following. By passing the canes though the mill, to extract the juice, it floats upon the surface of the troughs, under the form of a white powder. The liquor, is gradually heated to the boiling point, without adding lime; the scum is carefully collected, and macerated in weak alcohol, to extract all the particles of sugar, and to destroy the viscidity which would otherwise present obstacles to a thorough washing with pure water; it is then allowed to drain upon cloths, and thoroughly dried. In this state it is reduced to powder; and treated with cold alcohol at 36°* in order to separate the "*chlorophylle.*" This process having been renewed several times, the portion which remains is treated with boiling alcohol at 36°* which extracts the "cérosie." The solution, collects in a mass during the cooling, from which the alcohol is separated by distillation. Nevertheless the "cérosie," thus obtained, always retains a small proportion of "chlorophylle.

About 30 quarts of juice from ribbon canes have produced about 22.5 grains of impure cérosie. In another trial M. Avequin procured by scraping, more than two grains of cérosie, in a violet cane.

One acre of canes, produced about 18,000, and consequently about 72 lbs. of cérosie. A plantation which rolls out yearly 300 acres of canes will then furnish 20,000 lbs. of cérosie.

M. Dumas has made an analysis of this substance which is well worthy of fixing the attention of chemists. Three combustions, produced him for its composition, C^{96}, H^{100}, O^2. In representing the cérosie, by the formule C^{96}, H^{96}, H^4, O^2. an alcohol will be produced, which will take rank next to ether, a substance which cérosie very much resembles in all cases.

Note.—The state of heat used is that of Reaumur, in which 80° corresponds to 212°, or boiling water of Fahrenheit.

* So in the manuscript.—ED. F. R.

ARTESIAN BORING AT PARIS.

From Silliman's Journal of Science and Arts.

Many years ago, near the Barriere de Grenelle, one of the highest points in Paris, a boring was begun to obtain water. It was discontinued after some years, and again resumed about seven years ago. The result has been successful. We have room only for the following facts, recently communicated by a friend in Paris. The water was at last obtained below the chalk, at the depth of nearly eighteen hundred feet. The torrent of water, about three cubic yards per minute, rises in a copious fountain in the grounds of an *abattoir*, (slaughter-house,) and is very pure. The column rises from a source one third of a mile below ground, and it spouts thirty feet above the surface. The temperature at the bottom of the boring* was nearly 83° of Fahrenheit, (that of a hot summer's day, such as is rarely known there on the surface,) thus confirming fully the increase of heat in the interior of the earth, by the average generally observed in similar cases of about 1° for fifty feet of descent, which, at the same rate of increase, would give a fountain of boiling water at two miles from the surface—full ignition of rocks at ten miles, and fusion at two hundred miles; thus leaving a firm crust to preserve the good citizens of Paris from being disturbed by the fear of breaking through, or by the danger of the immediate outburst of the fire.

DISCOVERY, IN VIRGINIA, OF THE REGULAR MINERAL SALT FORMATION.

From Silliman's Journal of Science and Arts.

As salt springs and fountains are very numerous in the western and south-western parts of the United States, it was natural to expect that mineral salt would, sooner or later, be discovered. Indeed, strata of salt, in regular position, and roofed and floored by beds of sandstone, were,

* Which is over eighteen inches wide at the top, and from seven to eight at the bottom, and lined with a metallic tube.

some few years since reported by the Rev. Mr. Parker,* a missionary among the Indians of the far west, as existing in abundance in a mountain on the Salmon river, among the Rocky mountains; but no mineral salt, in the solid form, had ever been discovered in the United States proper. Now, however, we have the pleasure of announcing this discovery on the authority of the Rev. Stephen Taylor, of Abingdon, Va. His letter to us is dated March 4, 1841, and was soon followed by a large box of salt of the most indubitable character.

It was taken from a well which is "still in the process of being dug, at the salt works about eighteen miles from Abingdon, in the county of Washington," now perhaps within the bounds of Smyth county. From Prof. Wm. B. Rogers, as the geologist of Virginia, we must expect a full scientific account of this salt formation, which, however, appears to have been discovered, as we are informed, since he visited that part of Virginia. The following particulars are derived from a correspondent of Mr. Taylor, and they may not be uninteresting in anticipation of the geological report of Prof. Rogers.

Different persons vary in their report of the depth of the different wells. That of the salt-rock well does not vary much from two hundred and sixty feet. At about thirty feet gypsum has been struck in all the wells, and in the salt-rock well has continued down to the solid bed of salt-rock, occasionally changing to slate and thin veins of blue soft clay. At about two hundred and thirty feet, they arrived at the first symptoms of salt, which from plaster, slate-rock and salt, gradually changed, the salt-rock assuming the predominant part.

The writer remarks, "we have, for thirty feet, continued through this substance, and now find the slate-rock gradually intermixing with it." Several wells have been bored at different times, within short distances of each other. It is said, that from one of them, some years ago, salt borings were extracted; salt water was found at two hundred and twenty-six feet deep.

From a single well, sufficient salt water is now extracted in twenty four hours, to afford one thousand bushels of merchantable salt, which more than supplies the demand in that region of Virginia.

The salt forwarded to us by Mr. Taylor, is highly crystalline in its structure, and except a red color, (obviously derived from iron,†) and occasional fragments of rocks mixed with it, appears to be very pure. Its taste is decidedly and purely saline, without bitterness; when pulverized, the red color almost disappears, and it is tolerably white. Some small pieces were perfectly white. Specimens of gypsum were enclosed in our box; they are of a very decided character—are finely granular in structure, and of a grayish white. We have no account of the other rocks found with the salt, but from the fragments intermixed presume that sandstone and marly clays are among them.

P. S. A second letter from Rev. S. Taylor, dated May 31, states, on the authority of Mr. W. Findley, who is the proprietor of the well in which the salt is found, that in sinking the well, they penetrated earth and rock about fifty or sixty feet, when they came upon the plaster through which they passed about one hundred and fifty or one hundred and seventy feet. They then struck upon the bed of salt, and penetrated it about fifty or sixty feet without reaching the salt water; they then abandoned the digging, applied the auger, and bored about ten feet more, as he supposes, through the salt, but the mixture of salt water renders it uncertain. The roof then appears to be gypsum but the floor is unknown.

* In conversation with the senior editor, Mr. Parker mentions (see his Travels, p. 108) seeing the salt a mile off on the left; he was too ill to climb up to it, but the Indians procured some for him, which was pure and crystallized.

† It is now ascertained that rock-salt is sometimes colored by animalcules.

LIEBIG'S ORGANIC CHEMISTRY.*

This work of Professor Liebig has received more respectful attention and applause than any on agriculture that has issued from the press; and whether judiciously applied in this case, or otherwise, this reception is indicative of greatly increased appreciation of agricultural chemistry. From the investigation of that branch of agricultural science, the best results must follow. And no work have we yet seen that furnished to agriculturists a more abundant store of scientific facts, and more subjects for thinking, and for further investigation, than the work now under consideration. But highly as we estimate the author's scientific researches, and his chemical facts, we are compelled to dissent from his theoretical views thence deduced. And yet, it would seem, from the several highly eulogistic notices which have preceded or immediately followed the republication of the work in this country, that the theoretical and new, and, as we deem them, the unsustained views, had chiefly served to command applause; and had eclipsed, in the eyes of the greatest admirers, the many interesting and important chemical facts, which (though used sometimes for wrong deductions) may serve, upon better understanding and more careful application, as the foundation of the most useful and important steps towards agricultural improvement. We therefore earnestly recommend to scientific agriculturists and to chemists to study Liebig; and while they should not receive his theoretical deductions without well weighing his train of reasoning, that they will treasure up and profitably apply the many important and unquestionable lights which he has furnished for reasoning, and for practical application.

In the first sketch of the 'Essay on Calcareous Manures,' which was published in 1821,† was the earliest assertion made in this country of the

* "Organic Chemistry in its application to Agriculture and Physiology. By Justus Liebig, M. D., Ph. D., F. R. S., M. R. I. A., &c., Professor of Chemistry in the University of Giessen. Edited from the manuscript of the author, by Lyon Playfair, Ph. D. First American edition, with an Introduction, Notes, and Appendix, by John W. Webster, M. D., Professor of Chemistry in Harvard University. Cambridge 1841."

† In the American Farmer, vol. iii., page 312.

doctrine of *acid soils*—which doctrine was set forth still more at length in 1832, when that essay was republished, and enlarged to a volume. The doctrine was before that time not only unsupported by authority, but utterly condemned by all that could be considered as good authority. It was advanced by the author hesitatingly, because of his want of the scientific attainments needed to pursue the discovery, and to establish it by proof direct and beyond dispute. And the assertion was met, by the few men of science who condescended to notice it at all, by flat denial of any acid ingredient existing in soil, or by a jeering demand of the proof to be furnished by exhibition of the separated acid.

But before another edition of that essay had been issued (in 1835) some of the most distinguished European chemists had ascertained the now generally conceded existence of an acid ingredient of soils in general, which was at first called *humic acid.* And now there are as few persons who would deny or even doubt the existence of acid in soil, as previously could have been found to give it credence on all the proof that could be adduced. It would be even amusing to compare the laborious indirect mode of proof (for want of direct evidence) brought at first to sustain the new position, with the now universal admission of the general existence of humic acid, or some acid principle, in soils.

But, after all, it was not that a new constituent part of soil was discovered in humic acid, or humin, but that acid properties were found in the previously well-known ingredient, called by Davy "vegetable extract," and "humus" by earlier French authors. This substance is the product of vegetable matter decaying in soil, and which necessarily must show as many shades of difference of texture and condition as there are minute steps in the progress of vegetable decomposition and decay. The chemists, however, were delighted with the discovery, when announced in Europe by Berzelius, Boullay, and other scientific names, and hastened to make its further investigation. Each gave a new name to every newly observed difference of condition, or chemical composition; and the consequence is, that so many new names have been applied, and as many different substances claimed to exist, that the whole subject is now as much involved in the confusion of knowledge, as before in ignorance. Thus, this substance, known to and described by Davy as but *one*, vegetable extract, and considered by him as the direct nutriment of plants, is now treated of under many names, and each claimed to designate a different chemical substance. Thus have been brought into use, and used to obscure and confuse rather than instruct, the terms *humin* and *humic acid, geine* and *geic acid, ulmin, coal of humus, extract of humus, carbonaceous mould, apotheme, crenic* and *apocrenic acids*, &c. &c. We would prefer to go back to the older and more simple nomenclature, and therefore approve of Liebig's. He says—

"The modifications of *humus* which are soluble in alkalies are called *humic acid*; while those which are insoluble have received the designations of *humin* and *coal of humus*." (p. 57.) "Humus is described *by chemists* as a brown substance, easily soluble in alkalies, but only slightly soluble in water, and produced during the decomposition of vegetable matters by the action of acids or alkalies."—(p. 57.)

The humin and humic acid produced by chemical and by natural decomposition have the same constituent parts, but varying much in proportions; and thus even the same name (many as are the names) does not indicate the same chemical compound.

"*Humic acid* formed by the action of hydrate of potash upon saw-dust contains, according to the accurate analysis of Peligot, 72 per cent. of carbon, while the humic acid obtained from turf and brown coal contains, according to Sprengel, only 58 per cent.; that produced by the action of dilute sulphuric acid upon sugar, 57 per cent. according to Malaguti; and that, lastly, which is obtained from sugar or from starch, by means of muriatic acid, according to the analysis of Stein, 64 per cent. All these analyses have been repeated with care and accuracy, and the proportion of carbon in the respective cases has been found to agree with the estimates of the different chemists above mentioned; so that there is no reason to ascribe the difference in this respect between the varieties of *humus* to the mere difference in the methods of analysis or degrees of expertness of the operators."—(p. 60.)

In a case where the most learned chemists so much differ and dispute, we shall not be so presumptuous as to offer an opinion in competition. But, until they shall settle their differences on this subject, and come to some general agreement which may be considered as received authority, it may be permitted to us, in common with the unlearned, to reject all these refinements. We shall therefore consider *humus* as vegetable extract and decaying matter generally; and *humin* as the less soluble, and *humic acid* as the more soluble portion.

All plants and vegetable products are composed principally of carbon, oxygen and hydrogen; of a very small proportion of nitrogen, (or azote,) and of small proportions of earths, alkalies, and metallic oxides.* The first three, and by far the larger of these constituents, are furnished in unlimited quantities by the atmosphere; that is, carbon by the carbonic acid of the atmosphere, and hydrogen and oxygen are the two constituents of water. Nitrogen was not supposed until lately to be a constituent of but few vegetable matters. But now, and by Liebig, it is supposed to be universally present, though in very small proportions, and to be essential to their existence. This constituent is also furnished in profusion by the atmosphere, of which, nitrogen forms 80 per cent. It is then only the other very small constituents, the earths, alkalies, and metallic oxides, left in the ashes of plants after burning, that are not furnished by the atmosphere, and in unlimited quantity; and these only must *necessarily* have been supplied to growing plants altogether and directly by the soil which the roots pervaded.

* The most important and very far the larger constituent parts of all plants, are furnished by or found in the atmosphere, and are there, of course, in a gaseous form, or presented as aeriform fluids. Oxygen and nitrogen, two gases, in certain uniform proportions, compose the atmospheric air. Carbonic acid, a gas, and always present in small quantities in the atmosphere, is a compound of carbon and oxygen. Hydrogen, which when separate is known only in gaseous form, when combined with oxygen forms water, which is held dissolved, and also as an aeriform fluid, when in the atmosphere. Ammonia, which Liebig considers so important a supporter of vegetable growth, is also a gas, and is a combination of nitrogen and hydrogen.

In former times there was much dispute as to what was the *food of plants*. Some contended that it was water alone; others air. Tull maintained, and his disciples thought he had proved, that finely divided earth was the food of plants, and that ploughing might serve as a perfect substitute for manure. Davy laid down that *vegetable extract*, soluble in water, was the food of plants; and this seemed to be clearly established both by his reasoning and experiments. This vegetable extract, when afterwards known under the names of humin, humic acid, and all the combinations of the latter with alkaline earths, &c., was still supposed to furnish *directly* to the roots much the greater part of the food of plants; the balance, not so received, being the carbonic acid absorbed by the leaves from the atmosphere, and of which the plant retains and assimilates the carbon, and discharges its other constituent, the oxygen, to purify the atmosphere. It is one of the most admirable provisions of nature, that while the breathing of animals, and the exhalations of all decaying matter, furnish carbonic acid to the atmosphere, plants are continually absorbing it by their leaves, and returning oxygen instead. For though the leaves give out nitrogen gas in some cases, and carbonic acid gas always at night, still the discharge of oxygen gas is very far the greatest. And thus stood received opinions—that plants received part of their sustenance from the atmosphere, through their leaves, but a larger part by directly drawing from the soil the soluble vegetable (or animal) matters, there present.

But Liebig maintains (and it had indeed been previously maintained by some others recently,) that vegetable extract, humus, or putrescent manures, whether naturally or artificially applied, and all of which change to or supply humin and humic acid, do not act *directly*, in the slightest degree, as the food of plants; but only, by combining with the oxygen of the atmosphere and forming with it carbonic acid, which is received *only* in the early stage of growth, and in but small quantity, by the roots, and much more abundantly, and then exclusively, by the leaves of plants after they are formed. Now if the author meant that humus was first decomposed, and furnished carbon to the roots of plants by the carbonic acid evolved, the practical results would not be materially different. For it still would be, as upon the other supposition, that the greater the quantity of humus, (or manure serving to form humus,) the greater the supply of carbon to the growing plants. But not so. It would indeed seem that the author considers the supply of carbon through the roots as so small, as to permit the inference that it is of very little importance. And the main and indeed almost entire supply being from the atmosphere, and through the leaves, it seems also to follow that the vegetable matters or manure, acting by first evolving carbonic acid into the atmosphere, would be almost as likely to give it to plants on the adjacent field, or adjacent farm, as to plants growing immediately above the place of extrication. For, when evolved, and loose above the surface of the earth, the carbonic acid gas must be carried off and diffused by the slightest breeze, and still more rapidly by high winds. Yet we all know that the beneficial effects of manure will show on, and be limited to plants standing on almost the precise space to which the manure was applied.

It is only while plants are very young, indeed before their leaves are developed, that Liebig supposes the roots to draw carbonic acid from the earth.

"Humus acts in the same manner in a soil permeable to air as in the air itself; it is a continued source of carbonic acid, which it emits very slowly. An atmosphere of carbonic acid, formed at the expense of the oxygen of the air, surrounds every particle of decaying humus. The cultivation of land, by tilling and loosening the soil, causes a free and unobstructed access of air. An atmosphere of carbonic acid is, therefore, contained in every fertile soil, and is the first and most important food for the young plants which grow in it."—(p. 105.)

"By loosening the soil which surrounds young plants, we favor the access of air, and the formation of carbonic acid; and on the other hand the quantity of their food is diminished by every difficulty which opposes the renewal of air. A plant itself effects this change of air at a certain period of its growth. The carbonic acid, which protects the undecayed humus from further change, is absorbed and taken away by the fine fibres of the roots, and by the roots themselves; this is replaced by atmospheric air, by which process the decay is renewed, and a fresh portion of carbonic acid formed. A plant at this time receives its food, both by the roots, and by the organs above ground, and advances rapidly to maturity.

"When a plant is quite matured, and when the organs, by which it obtains food from the atmosphere, are formed, the carbonic acid of the soil is no further required.

"Deficiency of moisture in the soil, or its complete dryness, does not now check the growth of a plant, provided it receives from the dew and the atmosphere as much as is requisite for the process of assimilation. During the heat of summer it derives its carbon exclusively from the atmosphere."—(p. 106.)

"Substances, containing a large proportion of carbon, are excreted by the roots and absorbed by the soil. Through the expulsion of these matters unfitted for nutrition, therefore, the soil receives again the greatest part of the carbon, which it had at first yielded to the young plants as food, in the form of carbonic acid."—(p. 116.)

"Plants do not exhaust the carbon of a soil, in the normal condition of their growth; on the contrary, they add to its quantity. But if it is true that plants give back more carbon to a soil than they take from it, it is evident that their growth must depend upon the reception of nourishment from the atmosphere. The influence of humus upon vegetation is explained by the foregoing facts, in the most clear and satisfactory manner.

"Humus does not nourish plants, by being taken up and assimilated in its unaltered state, but by presenting a slow and lasting source of carbonic acid, which is absorbed by the roots, and is the principal nutriment of young plants at a time when, being destitute of leaves, they are unable to extract food from the atmosphere."—(p. 116.)

In a previous passage it is said—

"The facts which we have stated in the preceding pages prove, that the carbon of plants must be derived exclusively from the atmosphere."—(p. 72.)

These passages show clearly that the author considers the carbon furnished through the roots (or directly from the soil) as very small. But other passages show that he supposes even the small quantity of carbon so taken up by the roots, to be more than replaced in the soil by subsequent excretions of the roots; and that under

culture and the continued growth of plants, the humus in the soil may even increase.

"It is certain that the gummy and resinous excrements observed by *Macaire-Princep* could not have been contained in the soil; and as we know that the carbon of a soil is not diminished by culture, but, on the contrary, increased, we must conclude, that all excrements which contain carbon must be formed from the food obtained by plants from the atmosphere."

"Both views [of the excreting action of the roots of plants] explain how it happens that after corn, corn cannot be raised with advantage, nor after peas, peas; but they do not explain how a field is improved by lying fallow, and *this in proportion to the care with which it is tilled and kept free from weeds*; nor do they show how a soil gains carbonaceous matter by the cultivation of certain plants, such as lucerne and esparsette.

"Theoretical considerations on the process of nutrition, as well as the experience of all agriculturists, so beautifully illustrated by the experiments of *Macaire-Princep*, leave no doubt that substances are excreted from the roots of plants, and that these matters form the means by which the carbon received from humus in the early period of their growth, is restored to the soil."—(pp. 210, 211.)

"Each of these [successive crops of] plants, during its growth, returns to the soil a certain quantity of substances containing carbon, which are gradually converted into humus, and are for the most part equivalent to as much carbon as the plants had formerly extracted from the soil in the state of carbonic acid."—(p. 216.)

The author endeavors to prove his position, that humus furnishes no food to plants directly, or otherwise than by evolving carbonic acid, by several ingenious arithmetical calculations, founded on the chemical proportions of the different substances in question. Thus, taking as data the slight solubility of humic acid, (as artificially produced by chemists,) he infers that all the known quantity of rain, that falls on an acre, could not possibly dissolve enough humic acid to furnish the carbon contained in the vegetable growth. He shows, by the like kind of calculation, founded on the lime and other substances found in the ashes of plants, with which humic acid might have formed *humates* and thus entered the plants, that such supplies are necessarily so small as to make good his position. But this mode of calculation, or reasoning, is altogether inadmissible—and if admitted, would lead to the most absurd consequences. For example—it has been calculated (by Dundonald) that all the lime taken up by the growth of an acre in a year does not exceed 80 pounds in the form of carbonate. Now it would be as legitimate a deduction from this fact, as are the arithmetical deductions of Liebig, that 80 pounds of carbonate of lime, equally and thoroughly diffused, would be enough to manure an acre for one crop, and that any increase of quantity would be in excess. Yet we know that 10 times 80 pounds would scarcely be perceptible in effect, and that 50 or 100 times as much would give no excess.

Again—by using the like data and mode of calculation, it might be shown by the chemical analysis of the products, that all the food of plants derivable from a certain soil in one year, upon any particular theory of nutrition, did not exceed the quantity that 20 loads (for example) of putrescent manure would supply. Yet the vegetable matters, decomposed or in the course of decomposition, previously in the soil, might have amounted to 40 loads; and yet not only would the 20 loads applied be not in excess, and therefore useless, but twice or thrice as much would have been still more beneficial. According to the calculation, the addition of manure, in any quantity, ought to be superfluous, and therefore useless.

The author also endeavors to maintain his ground by the assumed fact, that cultivated lands, from which crops are taken off, and no sufficient return made, still increase in their stock of carbon, notwithstanding the removal of it in the crops. It is thus he speaks:

"Let us now inquire whence the grass in a meadow, or the wood in a forest, receives its carbon, since there no manure,—no carbon,—has been given to it as nourishment? and how it happens, that the soil, thus exhausted, instead of becoming poorer, becomes every year richer in this element?

"A certain quantity of carbon is taken every year from the forest or meadow, in the form of wood or hay, and, in spite of this, the quantity of carbon in the soil augments; it becomes richer in humus.

"It is said, that in fields and orchards all the carbon which may have been taken away, as herbs, as straw, as seeds, or as fruit, is replaced by means of manure; and yet this soil produces no more carbon than that of the forest or meadow where it is never replaced. It cannot be conceived that the laws for the nutrition of plants are changed by culture,—that the sources of carbon for fruit or grain, and for grass or trees, are different.

"It is not denied that manure exercises an influence upon the developement of plants; but it may be affirmed with positive certainty, that it neither serves for the production of the carbon, nor has any influence upon it, because we find that the quantity of carbon produced by manured lands is not greater than that yielded by lands which are not manured. The discussion as to the manner in which manure acts has nothing to do with the present question, which is the origin of the carbon. The carbon must be derived from other sources; and as the soil does not yield it, it can only be extracted from the atmosphere."—(pp. 68, 69.)

Now, in the first place, it is not correct to say that land receives "no manure," because foreign manure is not brought and applied to it. A forest or a meadow, though yielding for removal part of the produce yearly, yet, from the portion left to fall and rot, may receive more carbon than is taken away. For so much carbon is certainly derived from the atmosphere through the leaves of growing plants, (according to every different theory,) that more than half the whole products may be taken away, and the other half may supply as much humus and carbon, or perhaps even cause an increase of both. But if the draught upon the land be carried beyond the amount of the supply, the stock of humus (and of productive power) will be reduced in proportion. Of this result, however rare in Germany, and on all well-regulated farms, Professor Liebig could have thousands of proofs on the severely cropped lands of this country. We have also known forest land to be much reduced in productive power, even before being cleared for cultivation, by its being partially and continually robbed of its wood for fuel, during many years previously.

But however we may differ as to the immediate source, or mode of supply of carbon to plants, either theory will teach that the supply is unbounded. The atmosphere contains about one per cent. of carbonic acid gas, which offers an

inexhaustible supply to growing plants. The furnishing of the two other largest constituent parts of all plants, oxygen and hydrogen, is also easy, and the supply unlimited, as water is composed of them, and is drawn up by the roots in any requisite quantity. But still, a very small proportion of the water received by a plant is decomposed by it, and the hydrogen and oxygen assimilated, and made part of its solid substance. Just as much however is so assimilated as is needed, and as the vigor of the plant can make use of, and appropriate. The nitrogen is as certainly and as bountifully supplied in different modes; and the small quantity of the earthy, alkaline and metallic substances necessary to the existence of plants are generally present in sufficient quantity.

And here let us glance at a difficulty which attends the view thus taken, and which difficulty is far greater upon Liebig's doctrine of the exclusive supply of carbon through the leaves, and which he does not attempt to remove. If to plants are offered by the atmosphere unlimited supplies of carbon, and also of nitrogen (as will be shown presently,) and of hydrogen and oxygen in rain water—and as the earth and air rarely fail to furnish enough of the essential earthy or other salts—why is it that exuberant productiveness is not shown on *every* soil—and that, on the contrary, the product of each soil is *strictly limited* by the measure of its own fertilizing ingredients? We cannot explain this mystery to our own satisfaction. But the nearest approach to explanation perhaps is, that the force of growth given by the soil enables the plant to seize upon and appropriate a certain increased but definite proportion of the inexhaustible treasures of the atmosphere. And thus, even though three parts out of four of the growth may perhaps be due to principles furnished by the atmosphere and by water, still that the benefit thence derived is nevertheless strictly limited by, and in proportion to, the measure of the fertility of the soil. For every addition of fertility, then, made to the soil, by manuring, three times as much effect will be added by the bounty of nature; and if man gives nothing, and removes all, then the richer bounties of nature are necessarily also withheld.

But whether furnished altogether through the leaves, or partly through the roots, the carbonic acid is decomposed, and its carbon fixed in the plant, and its oxygen evolved, through the leaves as gas.

Hydrogen and oxygen are usually found in plants in the precise proportions in which these two elements form water. But in some plants the hydrogen is in excess, and more rarely the oxygen. In all cases, the plant decomposes the water needed for combination and assimilation, fixes its elements, and discharges into the air the excess of gas not combined.

Next will be considered our author's views of the source and manner of the supply of nitrogen to growing plants.

Nitrogen forms but a small proportion, but yet an essential part of all plants. As it is a large constituent of all animal bodies, so it seems to furnish qualities to vegetables which are similar to those of animal matter, and is most abundant in the parts of vegetables (as the seeds) which are most nutritious, as food to animals, and as manures to other cultivated plants. It is a constituent part of the vegetable albumen, and the gluten of wheat; and generally, because of the richness it indicates, it is a constituent of plants much more important in proportion to quantity than their other elements.

As nitrogen gas is one of the two constituents of the atmosphere, it would seem, at first view, that there was the most unlimited and universally pervading supply of this essential and richest of the elements of vegetables. But the laws of nature do not permit this one of her bounties to be thus directly drawn upon. Liebig says—

"We have not the slightest reason for believing that the nitrogen of the atmosphere takes part in the processes of assimilation of plants and animals; on the contrary, we know that many plants emit the nitrogen which is absorbed by their roots, either in the gaseous form, or in solution in water. But there are, on the other hand, numerous facts, showing, that the formation in plants of substances containing nitrogen, such as gluten, takes place in proportion to the quantity of this element which is conveyed to their roots in the state of ammonia, derived from the putrefaction of animal matter."—(p. 126, 7.)

"Plants, as we know, grow perfectly well in pure charcoal, if supplied at the same time with rain-water. Rain-water can contain nitrogen only in two forms, either as dissolved atmospheric air, or as ammonia. Now, the nitrogen of the air cannot be made to enter into combination with any element except oxygen, even by employment of the most powerful chemical means."—(p. 126.)

"Ammonia, too, is capable of undergoing such a multitude of transformations, when in contact with other bodies, that in this respect it is not inferior to water, which possesses the same property in an eminent degree. It possesses properties which we do not find in any other compound of nitrogen; when pure, it is extremely soluble in water; it forms soluble compounds with all the acids; and when in contact with certain other substances, it completely resigns its character as an alkali, and is capable of assuming the most various and opposite forms."—(p. 127.)

"We find this nitrogen in the atmosphere, in rain-water, and in all kinds of soils, in the form of ammonia, as a product of the decay and putrefaction of preceding generations of animals and vegetables. We find, likewise, that the proportion of azotized matters in plants is augmented by giving them a larger supply of ammonia conveyed in the form of animal manure.

"No conclusion can then have a better foundation than this, that it is the ammonia of the atmosphere which furnishes nitrogen to plants."—(p. 146.)

Thus reasoning that the vast magazine of nitrogen in the atmosphere, though the only source of the supply, furnishes none directly to plants, and that they are supplied immediately only from the soil and through their roots, the author proceeds to point out the true sources of the necessary supply.

"Let us picture to ourselves the condition of a well cultured farm, so large as to be independent of assistance from other quarters. On this extent of land there is a certain quantity of nitrogen contained both in the corn and fruit which it produces, and in the men and animals which feed upon them, and also in their excrements. We shall suppose this quantity to be known. The land is cultivated without the importation of any foreign substance containing nitrogen. Now, the products of this farm must be exchanged every year for money, and other necessaries of life, for bodies, therefore, which contain no nitrogen. A certain proportion of nitrogen is exported

with corn and cattle; and this exportation takes place every year, without the smallest compensation; yet after a given number of years, the quantity of nitrogen will be found to have increased. Whence, we may ask, comes this increase of nitrogen? The nitrogen in the excrements cannot reproduce itself, and the earth cannot yield it. Plants, and consequently animals, must, therefore, derive their nitrogen from the atmosphere.

"The last products of the decay and putrefaction of animal bodies present themselves in two different forms. They are in the form of a combination of hydrogen and nitrogen, *ammonia*, in the temperate and cold climates, and in that of a compound, containing oxygen, *nitric acid*, in the tropics and hot climates. The formation of the latter is preceded by the production of the first. Ammonia is the last product of the putrefaction of animal bodies; nitric acid is the product of the transformation of ammonia. A generation of a thousand million men is renewed every thirty years: thousands of millions of animals cease to live, and are reproduced in a much shorter period. Where is the nitrogen which they contained during life? There is no question which can be answered with more positive certainty. All animal bodies, during their decay, yield the nitrogen which they contain to the atmosphere, in the form of ammonia. Even in the bodies buried sixty feet under ground in the churchyard of the Eglise des Innocens, at Paris, all the nitrogen contained in the adipocire was in the state of ammonia. Ammonia is the simplest of all the compounds of nitrogen; and hydrogen is the element for which nitrogen possesses the most powerful affinity.

"The nitrogen of putrefied animals is contained in the atmosphere as ammonia, in the form of a gas which is capable of entering into combination with carbonic acid, and of forming a volatile salt. Ammonia in its gaseous form as well as all its volatile compounds is of extreme solubility in water.* Ammonia, therefore, cannot remain long in the atmosphere, as every shower of rain must condense it, and convey it to the surface of the earth. Hence, also, rain-water must, at all times, contain ammonia, though not always in equal quantity. It must be greater in summer than in spring or in winter, because the intervals of time between the showers are in summer greater; and when several wet days occur, the rain of the first must contain more of it than that of the second. The rain of a thunder-storm, after a long protracted drought, ought for this reason to contain the greatest quantity, which is conveyed to the earth at one time."—(pp. 128, 130.)

And here let us observe the remarkable contrast presented by the two principal new positions of the author, in regard to two of the most important supplies of this material to plants. Nitrogen, which, as part of the atmosphere, surrounds a plant always, and is present in the greatest imaginable profusion, cannot enter its body directly, or even indirectly (in the form of ammonia) except from the soil and through the roots. On the contrary, the humus, or decayed vegetable matter or putrescent manure, in the soil, as Liebig maintains, furnishes only carbonic acid to plants, and that almost exclusively through the atmosphere and by way of the leaves.

Though chemists have not been able to detect ammonia in atmospheric air, because of the very small proportion, it is found with certainty when collected from the atmosphere by the descent of rain and snow and therein condensed. Liebig estimates the usual proportion of ammonia in rain and snow water to be one-fourth of a grain to the pound of water; and then, by arithmetical calculation, (founded on the annual quantity of rain,) he deduces that 65 Hessian pounds of ammonia would be the annual supply to the Hessian acre; which quantities, reduced to American weight and measure, are equal to 116 pounds of ammonia to the acre, derived solely from the atmosphere. This would furnish more nitrogen than a crop on the same land of wood, hay, or beets, but less than would be contained in the roots, straw and grain of a crop of wheat. (p. 132.)

This is a most important fact—and is still so, even if the quantity of ammonia thus supplied to the soil be reduced to less than half of Liebig's estimate, as is done upon the authority of other chemical experiments, as is stated in the June number of the Quarterly Journal of Agriculture, by an intelligent writer and chemist. Upon either supposition, it is a bountiful additional supply, from foreign sources and materials, of highly fertilizing principles, to every cultivator; and who, at the same time, may by proper care prevent the escape of ammonia from the materials on his own farm into the general atmosphere.

"It is worthy of observation, that the ammonia contained in rain and snow water, possessed an offensive smell of perspiration and animal excrements,—a fact which leaves no doubt respecting its origin."—(p. 133.)

"Any one may satisfy himself of the presence of ammonia in rain, by simply adding a little sulphuric or muriatic acid to a quantity of rain-water, and evaporating this nearly to dryness in a clean porcelain basin. The ammonia remains in the residue, in combination with the acid employed; and may be detected either by the addition of a little chloride of platinum, or more simply by a little powdered lime, which separates the ammonia, and thus renders its peculiar pungent smell sensible. The sensation which is perceived upon moistening the hand with rain-water, so different from that produced by pure distilled water, and to which the term *softness* is vulgarly applied, is also due to the carbonate of ammonia contained in the former.

"The ammonia, which is removed from the atmosphere by rain and other causes, is as constantly replaced by the putrefaction of animal and vegetable matters. A certain portion of that which falls with the rain, evaporates again with the water; but another portion is, we suppose, taken up by the roots of plants, and, entering into new combinations in the different organs of assimilation, produces albumen, gluten, quinine, morphia, cyanogen, and a number of other compounds containing nitrogen."—(pp. 133-4.)

Carbonic acid gas, which also is always diffused through the atmosphere, is readily absorbed by water; and hence all rain water contains carbonic acid, which of course must unite, according to its quantity, with the ammonia present therein. This would furnish to the soil and to plants carbonate of ammonia, which is a very volatile solid, dissolved, instead of pure ammonia, a gas absorbed and temporarily condensed by water. However, if growing plants were ready to take up the supply of either as fast as furnished by rains, the ultimate result would probably not be affected by the different conditions of the ammonia. But, if no plants were ready to receive the supply, we infer that much the greater part, in either case, would be lost by evaporation and going off into the atmosphere.

* "According to Dr. Thomson, water absorbs 780 times its bulk of ammonia."

"The employment of animal manure in the cultivation of grain, and the vegetables which serve for fodder to cattle, is the most convincing proof that the nitrogen of vegetables is derived from ammonia. The quantity of gluten in wheat, rye, and barley, is very different; these kinds of grain also, even when ripe, contain this compound of nitrogen in very different proportions. Proust found French wheat to contain 12·5 per cent. of gluten; Vogel found that the Bavarian contained 24 per cent.; Davy obtained 19 per cent. from winter, and 24 from summer wheat; from Sicilian 21, and from Barbary wheat 19 per cent. The meal of Alsace wheat contains, according to Boussingault, 17.3 per cent. of gluten; that of wheat grown in the "Jardin des Plantes" 26.7, and that of winter wheat 3.33 per cent. Such great differences must be owing to some cause, and this we find in the different methods of cultivation. An increase of animal manure gives rise not only to an increase in the number of seeds, but also to a most remarkable difference in the proportion of the gluten which they contain.

"*Animal manure, as we shall afterwards show, acts only by the formation of ammonia.* One hundred parts of wheat grown on a soil manured with cow-dung (a manure containing the smallest quantity of nitrogen,) afforded only 11.95 parts of gluten, and 64.34 parts of amylin, or starch; whilst the same quantity, grown on a soil manured with human urine, yielded the maximum of gluten, namely 35.1 per cent. Putrefied urine contains nitrogen in the forms of carbonate, phosphate, and lactate of ammonia and in no other form, than that of ammoniacal salts.

"Putrid urine is employed in Flanders as a manure with the best results. During the putrefaction of urine, ammoniacal salts are formed in large quantity, it may be said exclusively; for under the influence of heat and moisture urea, the most prominent ingredient of the urine, is converted into carbonate of ammonia. The barren soil on the coast of Peru is rendered fertile by means of a manure called *guano*, which is collected from several islands on the South Sea.* It is sufficient to add a small quantity of guano to a soil, which consists only of sand and clay, in order to procure the richest crop of maize. The soil itself does not contain the smallest particle of organic matter, and the manure employed is formed only of *urate*, *phosphate*, *oxalate*, and *carbonate of ammonia*, together with a few earthy salts."—(pp. 136, 137.)

"The urine of men and of carnivorous animals contains a large quantity of nitrogen, partly in the form of phosphates, partly as urea. Urea is converted during putrefaction into carbonate of ammonia, that is to say, it takes the form of the very salt which occurs in rain-water. Human urine is the most powerful manure for all vegetables containing nitrogen; that of horses and horned cattle contains less of this element, but infinitely more than the solid excrements of these animals."—(p. 138.)

"The solid excrements of animals contain comparatively very little nitrogen, but this could not be otherwise. The food taken by animals supports them only in so far as it offers elements for assimilation to the various organs, which they may require for their increase or renewal. Corn, grass, and all plants, without exception, contain azotized substances. The quantity of food, which animals take for their nourishment, diminishes or increases in the same proportion, as it contains more or less of the substances containing nitrogen. A horse may be kept alive by feeding it with potatoes, which contain a very small quantity of nitrogen; but life thus supported is a gradual starvation; the animal increases neither in size nor strength, and sinks under every exertion."—(p. 139.)

The deductions and practical applications to be made from Liebig's chemical facts in regard to nitrogen and ammonia are so important, that we may be excused from quoting still more at length.

"As it is evident that the nitrogen of the plants and seeds used by animals as food must be employed in the process of assimilation, it is natural to expect that the excrements of these animals will be deprived of it, in proportion to the perfect digestion of the food, and can only contain it when mixed with secretions from the liver and intestines. Under all circumstances, they must contain less nitrogen than the food. When, therefore, a field is manured with animal excrements, a smaller quantity of matter containing nitrogen is added to it than has been taken from it in the form of grass, herbs, or seeds. By means of manure, an addition only is made to the nourishment which the air supplies.

In a scientific point of view, it should be the care of the agriculturist so to employ all the substances containing a large proportion of nitrogen which his farm affords in the form of animal excrements, that they shall serve as nutriment to his own plants. This will not be the case unless those substances are properly distributed upon his land. A heap of manure lying unemployed upon his land would serve him no more than his neighbors. The nitrogen in it would escape as carbonate of ammonia into the atmosphere, and a mere carbonaceous residue of decaying plants would, after some years, be found in its place.

All animal excrements emit carbonic acid and ammonia, as long as nitrogen exists in them. In every stage of their putrefaction an escape of ammonia from them may be induced by moistening them with a potash ley; the ammonia being apparent to the senses by a peculiar smell, and by the dense white vapor which arises when a solid body moistened with an acid is brought near it. This ammonia evolved from manure is imbibed by the soil either in solution in water, or in the gaseous form, and plants thus receive a larger supply of nitrogen than is afforded to them by the atmosphere.

But it is much less the quantity of ammonia, yielded to a soil by animal excrements, than the form in which it is presented by them, that causes their great influence on its fertility. Wild plants obtain more nitrogen from the atmosphere in the form of ammonia than they require for their growth, for the water which evaporates through their leaves and blossoms, emits, after some time, a putrid smell, a peculiarity possessed only by such bodies as contain nitrogen. Cultivated plants receive the same quantity of nitrogen from the atmosphere as trees, shrubs, and other wild plants; but this is not sufficient for the purposes of agriculture. Agriculture differs essentially from the cultivation of forests, inasmuch as its principal object consists in the production of nitrogen under any form capable of assimilation; whilst the object of forest culture is confined principally to the production of carbon. All the various means of culture are subservient to these two main purposes. A part only of the carbonate of ammonia, which is conveyed by rain to the soil, is received by plants, because a certain quantity of it is volatilized with the vapor of water; only that portion of it can be assimilated which sinks deeply into the soil, or which is conveyed directly to the leaves by dew, or is absorbed from the air along with the carbonic acid.

Liquid animal excrements, such as the urine with which the solid excrements are impregnated, contain the greatest part of their ammonia in the state of salts, in a form, therefore, in which it has completely lost its volatility when presented in this condition;

* "The guano, which forms a stratum of several feet in thickness upon the surface of these islands, consists of the putrid excrements of innumerable sea-fowl that remain on them during the breeding season.

"According to Fourcroy and Vauquelin it contains a fourth part of its weight of uric acid, with ammonia and potash."

not the smallest portion of the ammonia is lost to the plants, it is all dissolved by water, and imbibed by their roots."—(pp. 140, 141, 142.)

The next passage, immediately succeeding, is a most interesting and valuable application of the action of chemical affinities to the preservation of ammonia and fixing it in the soil, for the future use of plants, by means of gypsum. But we deem the explanation thence deduced, of the *modus operandi* of gypsum as manure, as entirely unsupported by experiment, or even by plausibility.

"The evident influence of gypsum upon the growth of grasses,—the striking fertility and luxuriance of a meadow upon which it is strewed,—depends only upon its fixing in the soil the ammonia of the atmosphere, which would otherwise be volatilized, with the water which evaporates. The carbonate of ammonia contained in rain water is decomposed by gypsum, in precisely the same manner as in the manufacture of sal-ammoniac. Soluble sulphate of ammonia and carbonate of lime are formed; and this salt of ammonia possessing no volatility is consequently retained in the soil. All the gypsum gradually disappears, but its action upon the carbonate of ammonia continues as long as a trace of it exists.

"The benficial influence of gypsum and of many other salts has been compared to that of aromatics, which increase the activity of the human stomach and intestines, and give a tone to the whole system. But plants contain no nerves; we know of no substance capable of exciting them to intoxication and madness, or of lulling them to sleep and repose. No substance can possibly cause their leaves to appropriate a greater quantity of carbon from the atmosphere, when the other constituents which the seeds, roots, and leaves require for their growth are wanting. The favorable action of small quantities of aromatics upon man, when mixed with his food, is undeniable, but aromatics are given to plants *without food* to be digested, and still they flourish with greater luxuriance.

"It is quite evident, therefore, that the common view concerning the influence of certain salts upon the growth of plants evinces only ignorance of its cause.

"The action of gypsum or chloride of calcium (bleaching salts) really consists in their giving a fixed condition to the nitrogen,—or ammonia which is brought into the soil, and which is indispensable for the nutrition of plants.

"In order to form a conception of the effect of gypsum, it may be sufficient to remark that 100 Hess. lbs. of burned gypsum fixes as much ammonia in the soil as 6250 lbs. of horse's urine would yield to it, even on the supposition that all the nitrogen of the urea and hippuric acid were absorbed by the plants without the smallest loss, in the form of carbonate of ammonia. If we admit with Boussingault, that the nitrogen in grass amounts to 1-100 of its weight, then every pound of nitrogen which we add increases the produce of the meadow 100 lbs., and this increased produce of 100 lbs. is effected by the aid of a little more than four pounds of gypsum.

"Water is absolutely necessary to effect the decomposition of the gypsum, on account of its difficult solubility, (1 part of gypsum requires 400 parts of water for solution,) and also to assist in the absorption of the sulphate of ammonia by the plants; hence it happens that the influence of gypsum is not observable on dry fields and meadows.

"The decomposition of gypsum by carbonate of ammonia does not take place instantaneously; on the contrary, it proceeds very gradually, and this explains why the action of the gypsum lasts for several years."—(pp. 142, 143, 144.)

These facts should teach the farmer the immense importance of saving, by immediately mixing and combining with gypsum, all the urine of man and beast that is usually almost entirely wasted; and which in towns forms a nuisance in its waste, and would be a commercial commodity of great fertilizing value, and at the same time be kept free from all offensiveness, if so treated. This part of the instruction cannot be too strongly impressed on country agriculturists, and upon town guardians of health and police. But we utterly deny that the mysterious action of gypsum as manure is hereby accounted for; though this view of Liebig's has been readily received by other reviewers in this country, and set forth as entirely satisfactory. Our objections cannot be here presented at length, and will be merely announced as concisely as possible.

In the first place, in all the various attempts made by theorists and by chemists to explain the *modus operandi* of gypsum as manure, not one has been satisfactory, or has served to meet all the common and well known cases of opposite results. Davy's opinion, so far as it goes, seems the most sound, and the only one that does not lead manifestly to error. He supposes that gypsum is a necessary though always a very small ingredient of certain plants, as clover, and therefore it must be a specific manure for such plants, unless gypsum be already present in the soil; and if so present, in the very small quantity required, that more gypsum applied as manure would be superfluous, and of no effect. We take this opinion to be sound and true. But it does not explain what almost every theorizer on the subject has attempted to explain, *why* and *how* gypsum is a manure at all, and still less that it should have such wonderful effects when fully operative.

In another place, we have formerly endeavored to show, not indeed *why* or *how* gypsum acts as a manure, but why it *does not* and *cannot* act on the many soils where it is always found to be inoperative. Our view was, that the gypsum was speedily decomposed by the acid of the soil, and a new salt of lime formed, which might be, and probably was, useful as manure to some extent; but *it was no longer gypsum*—and of course could not exhibit the peculiar and wonderful productive power which gypsum alone, of all mineral manures, has shown in such very light dressings as a bushel to the acre.

Now, as complete a decomposition, and change of principles, is supposed by Liebig, in the double decomposition and re-composition of the elements of the two substances of which he treats. The separate salts, sulphate of lime (gypsum) and carbonate of ammonia, exchange principles, and become two other separate salts, carbonate of lime and sulphate of ammonia. And in the latter, the ammonia being fixed instead of volatile, (as in carbonate of ammonia,) it is to this quality of being fixed that Liebig ascribes all the benefits produced by the application of gypsum. It is *not gypsum*, according to his view, which acts, but *ammonia;* and that, not by being supplied anew, or in addition, but merely by being made more fixed and permanent in the soil.

We have no doubt but that the sulphate of ammonia, as of every salt of ammonia, must be valuable manure. But before claiming for it all the wonders produced by gypsum, it would have conformed more to inductive science, and would have

* Essay on Calcareous Manures, 2d ed., pp. 57, 92.

been easy of trial, if Liebig had used the sulphate of ammonia, ready formed, as manure, and in as small quantity to the acre as it is furnished through gypsum. If such experiment is made, and the results like those known from gypsum are produced, then the doctrine of Liebig will have the support of facts. Without this, it is unsupported both by experiment and by reasoning. If admitting it to be fully true, then, ammonia, being a universal manure, gypsum, by fixing ammonia, would be beneficial on all soils and to all plants. But nothing is better known of gypsum than that it is almost, and generally, entirely inoperative on the greater number of soils or localities, and also for the greater number of cultivated plants.

Again—when any application of manure to land serves to increase its product as much as 100 per cent., (as is not unusual from one bushel of gypsum sown on an acre of clover,) it must be inferred that there was before in the soil either none, or a much less quantity, of the same manure. But according to the calculation of Liebig, before referred to, 116 pounds of ammonia would be the annual supply of an acre, brought from the atmosphere by rain and snow. Of this quantity only about 17 pounds could be united with the sulphuric acid of a bushel, or 85 pounds of gypsum,* and be thereby fixed in the soil. It is beyond all question, that the benefit of the annual and gradual supply of 116 lbs. of ammonia by rain to a crop like clover, which is always ready to imbibe it through its living roots, could not be increased 100 per cent. on the effect of that *and of all other existing manures*, or causes of productiveness, by merely making more *fixed* 17 pounds of the 116 pounds of ammonia otherwise furnished.

Liebig accounts for the fertilizing quality of burnt clay, which has been so mysterious, to the chemical power it exerts to combine with ammonia, and also to attract it from the atmosphere and hold it for the use of growing plants. Oxides of iron have the same chemical power in regard to ammonia, and therefore the author places them in the same class as fertilizing ingredients of soil. But ferruginous soil, of itself, is *not* fertile, but the reverse; it is only when they are also enough calcareous that ferruginous soils seem to be the more fertile because of their iron. Thus the author's position is rendered untenable by covering too much ground. After stating that all rusts of iron and all minerals containing iron, absorb and hold ammonia, he says—

"The peculiar odor observed on moistening minerals containing alumina, is partly owing to their exhaling ammonia. Indeed, gypsum and some varieties of alumina, pipe-clay for example, emit so much ammonia, when moistened with caustic potash, that even after they have been exposed for two days, litmus paper held over them becomes blue. Soils, therefore, which contain oxides of iron, and burned clay, must absorb ammonia, an action which is favored by their porous condition; they further prevent the escape of the ammonia once absorbed, by their chemical properties."—(p. 145.)

"The ammonia absorbed by the clay or ferruginous oxides is separated by every shower of rain, and conveyed in solution to the soil.

"Powdered charcoal possesses a similar action, but surpasses all other substances in the power which it possesses of condensing ammonia within its pores, particularly when it has been previously heated to redness. Charcoal absorbs 90 times its volume of ammoniacal gas, which may be again separated by simply moistening it with water (*De Saussure.*) Decayed wood approaches very nearly to charcoal in this power; decayed oak wood absorbs 72 times its volume, after having been completely dried under the air-pump. We have here an easy and satisfactory means of explaining still further the proprieties of *humus*, or wood in a decaying state. It is not only a slow and constant source of carbonic acid, but it is also a means by which the necessary nitrogen is conveyed to plants."—(p. 146.)

It would seem to us, as a necessary deduction from the foregoing extract, that powdered charcoal ought to be the richest fertilizer, and therefore best manure, that could be applied to soil, and rotten wood not much inferior. Yet all farmers know that neither of these substances possess any thing like such value.

We have remarked at sufficient length on our author's views of the modes by which plants are supplied with their larger and more important and indeed essential constituent parts, carbon, hydrogen, oxygen and nitrogen. And all these are furnished to vegetation either remotely and indirectly, or immediately and directly, from the atmosphere, in gaseous form, and from sources unlimited and inexhaustible in quantity. The only other constituents of plants, and which are of inorganic origin, and not necessarily belonging to air or water, but which must be necessarily furnished by the soil, are the solid matters indestructible by burning, and left in small quantities in the ashes of plants. These, though altogether forming but a very small proportion of plants, are of sundry kinds and varying proportions of earths, alkaline salts and metallic oxides. Some of these, as salts of lime and of potash, from their being universally found in plants, must be essential to their healthy existence; and of course these substances, or their elements, are indispensable to every soil, and should be supplied as manure if exhausted by cropping, or otherwise naturally deficient. But almost every natural soil possesses these elements in the small quantity necessary for crops; and they are re-supplied to the soil in ordinary putrescent manures, containing animal admixtures. Carbonate of lime in large quantity is beneficial as manure, for other and more important purposes than to furnish the small ingredient required by growing plants. The sulphate of lime (gypsum) has been already spoken of. The phosphate of lime (the material of bones) is essential to wheat and certain other plants, and is often deficient in long cultivated and exhausted lands. Hence the great effect of bone dust as manure, even in small quantities. There can be no doubt but that the other usual inorganic constituent parts of plants, are necessary or beneficial, and should be supplied if deficient in the soil. Of this no doubt is entertained as to potash. Muriate of soda (common salt,) and oxide of iron, are also certainly beneficial, and perhaps are also essential ingredients of soil and of plants. And it may be that if one of these substances be essential to vegetation in the smallest proportion, and yet absent, that a few pounds of that substance might be an ample and most productive manure for an acre. But very

* 100 sulphate of lime composed of 32½ lime, 46½ sulphuric acid (dry) and 21 water. 100 carbonate of ammonia, 43½ ammonia and 56½ carbonic acid.

little is yet known on this subject, and it offers a fertile field for investigation to agricultural chemists and scientific agriculturists. Liebig's remarks on these elements of plants supplied from inorganic nature, present less of what is either new or important than the other branches of his researches.

"Most plants, perhaps all of them, contain organic acids of very different composition and properties, all of which are in combination with bases, such as potash, soda, lime or magnesia."—(p. 148.)

"The acids found in the different families of plants are of various kinds; it cannot be supposed that their presence and peculiarities are the result of accident. The fumaric and oxalic acids in the liverwort, the kinovic acid in the *China nova*, the rocellic acid in the *Rocella tinctoria*, the tartaric acid in grapes, and the numerous other organic acids, must serve some end in vegetable life. But if these acids constantly exist in vegetables, and are necessary to their life, which is incontestable, it is equally certain that some alkaline base is also indispensable in order to enter into com bination with the acids which are always found in the state of salts. All plants yield by incineration ashes containing carbonic acid; all therefore must contain salts of an organic acid.

"Now, as we know the capacity of saturation of organic acids to be unchanging, it follows that the quantity of the bases united with them cannot vary, and for this reason the latter substances ought to be considered with the strictest attention both by the agriculturist and physiologist.

"We have no reason to believe that a plant in a condition of free and unimpeded growth produces more of its peculiar acids than it requires for its own existence; hence, a plant, on whatever soil it grows, must contain an invariable quantity of alkaline bases. Culture alone will be able to cause a deviation.

"In order to understand this subject clearly, it will be necessary to bear in mind, that any one of the alkaline bases may be substituted for another, the action of all being the same. Our conclusion is, therefore, by no means endangered by the existence of a particular alkali in one plant, which may be absent in others of the same species. If this inference be correct, the absent alkali or earth must be supplied by one similar in its mode of action, or in other words, by an equivalent of another base."—(pp. 149, 150.)

This view is illustrated by statements of the alkaline contents of the ashes of different specimens from different soils of the same plant; in which, though the proportions of the salts of potash, lime, and magnesia, varied considerably, yet there was a remarkable equality in the total quantities of oxygen (the acidifying principle) found in the ashes of each different specimen.

"Firs and pines find a sufficient quantity of alkalies in granitic and barren sandy soils, in which oaks will not grow; and wheat thrives in soils favorable for the linden-tree, because the bases, which are necessary to bring it to complete maturity, exist there in sufficient quantity. The accuracy of these conclusions, so highly important to agriculture and to the cultivation of forests, can be proved by the most evident facts.

"All kinds of grasses, the *equisetaceæ*, for example, contain in the outer parts of their leaves and stalk a large quantity of silicic acid and potash, in the form of acid silicate of potash. The proportion of this salt does not vary perceptibly in the soil of corn-fields, because it is again conveyed to them as manure in the form of putrefying straw. But this is not the case in a meadow, and hence we never find a luxuriant crop of grass on sandy and calcareous soils which contain little potash, evidently because one of the constituents indispensable to the growth of the plants is wanting. Soils formed from basalt, grauwackè, and porphyry are, *cæteris paribus*, the best for meadow land, on account of the quantity of potash which enters into their composition. The potash abstracted by the plants is restored during the annual irrigation. That contained in the soil itself is inexhaustible in comparison with the quantity removed by plants."—(pp. 158, 159.)

"The most decisive proof of the use of strong manure was obtained at Bingen (a town on the Rhine,) where the produce and developement of vines were highly increased by manuring them with such substances as shavings of horn, &c., but after some years the formation of the wood and leaves decreased to the great loss of the possessor, to such a degree, that he has long had cause to regret his departure from the usual methods. By the manure employed by him, the vines had been too much hastened in their growth; in two or three years they had exhausted the potash in the formation of their fruit, leaves, and wood, so that none remained for the future crops, his manure not having contained any potash.

"There are vineyards on the Rhine, the plants of which are above a hundred years old, and all of these have been cultivated by manuring them with cow-dung, a manure containing a large proportion of potash, although very little nitrogen. All the potash, in fact, which is contained in the food consumed by a cow is again immediately discharged in its excrements.

"The experience of a proprietor of land in the vicinity of Gottingen offers a most remarkable example of the incapability of a soil to produce wheat or grasses in general, when it fails in any one of the materials necessary to their growth. In order to obtain potash, he planted his whole land with wormwood, the ashes of which are well known to contain a large proportion of the carbonate of that alkali. The consequence was, that he rendered his land quite incapable of bearing grain for many years, in consequence of having entirely deprived the soil of its potash."—(p. 161.)

"It is thought very remarkable, that those plants of the grass tribe, the seeds of which furnish food for man, follow him like the domestic animals. But saline plants seek the sea-shore, or saline springs, and the chenopodium the dunghill from similar causes. Saline plants require common salt, and the plants which grow only on dunghills, need ammonia and nitrates, and they are attracted whither these can be found, just as the dung-fly is to animal excrements. So likewise none of our corn plants can bear perfect seeds, that is, seeds yielding flour, without a large supply of phosphate of magnesia and ammonia, substances which they require for their maturity. And hence, these plants grow only in a soil where these three constituents are found combined, and no soil is richer in them, than those where men and animals dwell together; where the urine and excrements of these are found corn plants appear, because their seeds cannot attain maturity unless supplied with the constituents of those matters."—(pp. 162, 163.)

Although it is now usually admitted that all these salts, oxides, and earths left in ashes after burning plants, are drawn by the roots from the soil, still it has not been long since even scientific investigators maintained that they were produced by the growth of plants, and were to be found in their structure even when not present in the soil. Schrader, a German chemist, says Professor Daubeny, "was honored with a prize from the Berlin Academy, for having, as was thought, established this position."

How then does it happen that so many of these

inorganic substances and generally in such small quantity, but yet sufficient for vegetation, are diffused through all known soils? This is an interesting question—which though not directly considered by our author, receives important lights from his facts. He shows clearly in the following passages, that portions of the salts held in solution by sea and other water are carried off into the air by evaporation, and thus are furnished to soils at very remote distances.

"The experiments instituted under Lavoisier's guidance by the *Direction des poudres et salpetres*, have proved that during the evaporation of the saltpetre ley, the salt volatilizes with the water, and causes a loss which could not before be explained. It is known also, that, in sea storms, leaves of plants in the direction of the wind are covered with crystals of salt, even at the distance of from 20 to 30 miles from the sea. But it does not require a storm to cause the volatilization of the salt, for the air hanging over the sea always contains enough of this substance to make a solution of nitrate of silver turbid, and every breeze must carry this away. Now, as thousands of tons of sea-water annually evaporate into the atmosphere, a corresponding quantity of the salts dissolved in it, viz. of common salt, chloride of potassium, magnesia, and the remaining constituents of the sea-water will be conveyed by wind to the land.

"This volatilization is a source of considerable loss in salt-works, especially where the proportion of salt in the water is not large. This has been completely proved at the salt-works of Naubeim, by the very intelligent director of that establishment, M. Wilhelmi, He hung a plate of glass between two evaporating houses, which were about 1200 paces distant from each other, and found in the morning, after the drying of the dew, that the glass was covered with crystals of salt on one or the other side, according to the direction of the wind.

"By the continual evaporation of the sea, its salts* are spread over the whole surface of the earth; and being subsequently carried down by the rain, furnish to the vegetation those salts necessary to its existence. This is the origin of the salts found in the ashes of plants, in those cases where the soil could not have yielded them."—(pp. 165, 166.)

Liebig does not say whether part of some only, or of all these different salts are taken up by evaporation and "spread over the whole surface of the earth;" but as no exception is stated by him, we may infer that all these salts, in minute proportions, are continually so resupplied to all soils. And here then are ample resources whence soils and plants may receive not only common salt (chloride of sodium, or muriate of soda,) and of soda, but also of potash, magnesia, and some little sulphate of lime. The lands within 20 or 30 miles of the sea coast must be much more plentifully supplied with salts, as violent tempests will carry sea water in vapor, and unchanged, many miles through the air. Hence it may well be believed that the lands of the Eastern Shore of Virginia are maintained in their productive condition by continual supplies of saline manure, furnished both by storms and continual exhalation. And as all these salts operate as manure in very small quantities, the greater or less amount of the natural and unknown supply, may well be the cause of the contradictory results of salts artificially applied. An application of a salt which would be very beneficial to a soil much in want of that particular ingredient, might be totally useless, or even hurtful, where the soil was before sufficiently supplied.

* According to Marcet, sea-water contains in 1000 parts,

26.660 chloride of sodium.
4.660 sulphate of soda.
1.232 chloride of potassium.
5.152 chloride of magnesium.
1.5 sulphate of lime.

ON THE BEDS OF LIMESTONE AND CALCAREOUS EARTH IN THE PEE DEE COUNTRY.

From the Farmers' Gazette.

Society Hill, July 27, 1841.

Yours of the 15th was duly received. In proceeding to answer you, I must premise that I cannot give any information worth publishing in the Farmers' Gazette. It is known to many that extensive banks of shells are found on the south-west side of the Pee Dee from Port's Ferry to Burch's Ferry. These banks wherever the river washes the bluff are found from 10 to 12 feet below the surface and from 6 to 10 feet thick, and extend back in places several hundred yards. At Burch's Ferry the bank approaches the pure limestone of a gray color; at Witherspoon's old place the limestone or shell bank is harder and purer than it is at the Bluffs above; at Savage's, Giles', Ervin's G. Witherspoon's and Allison's old places the shell bank is a light yellow. It seems composed of decayed shells, sand and earthy matter. The most common of the shells not decomposed are flat pieces from 3 to 4 or 5 inches long and as broad, and $\frac{1}{4}$ of an inch thick. Not being a choncologist I cannot give you the name of this shell. It is evidently but the remnant of some large shell fish, and as I have understood considered as extinct. The next most prevailing shell is the fluted clam of various sizes, periwinkles, &c. &c. I do not know that any of the banks above mentioned have ever been analyzed. A bank of the same appearance as the yellow bank of the Pee Dee has been found on the plantation of the late John Gibson, near Darlington Court-house, and I understood from him that he had sent a lump of the shell bank to Dr. Cooper to analyze, and upon analysis, he found it to contain, I think, about 70 per cent. of pure lime. Large beds of limestone are found at Legget's, and at Meyers', on or near the road to Georgetown. Samples of this stone or rock were pronounced by the late Col. Blanding to be the burrstone. I understand Dr. Harllee of Marion District has leased or purchased Meyers' bed of stone, and has commenced burning lime and offers it for sale at $1 per barrel. Large beds of this limestone are found also on Willow Creek, in the Marion District, 5 or 8 miles from Myers'. From this quarry, old Captain William Wilson, in old indigo times, burnt lime for indigo making, tanning, and brick work, &c. He had a kiln to burn the rock in, but how constructed I cannot say. Mr. R. Gordon, who now owns a part of this quarry or bed of limestone, told me he had tried the old country plan of burning oyster shells, and found it would not burn the rock sufficient to decompose it.

In the Carolina process of making indigo, lime-water was considered necessary to settle the coloring matter. My father at times I know used the yellow limestone rock, and burned it into lime.

My father's process was to have wood cut four feet long, and when partly dried, to place two pieces of this wood at four feet apart, and a piece in the middle, then he placed a piece across each end and side, making an open pen of four or five inches deep. This was then filled with the rock broken into fragments from four to six inches diameter, another layer of wood as above, then rock again, till he got the pile five or six feet high ; fire was then placed underneath the pile, and when the wood was consumed the rock was found sufficiently burned to decompose. In the improved process of indigo making in the East Indies and South America, I understand they do not use lime. I hope the East Indians may not supplant us as effectually in raising cotton as they did in indigo.

Some twenty years ago, when I had more youth and energy than I now have, I had a boat built with a view to bring up lime from the banks below. It so happened that my crop the year I got my boat ready was a light one. The first down load was taken, and on the boat's return I ordered my people to bring up a load of limestone. Before they returned as high as the limestone banks the river was up, and my people found it difficult to get at the rock, and got only the surface or upper part of the rock, which was inferior to that which is found deeper. This load I had hauled to my plantation, burned in my father's plan as above described, and found the rock sufficiently burned to decompose. The lime I ordered to be sprinkled in the drill where I intended to plant cotton, and drilled thick enough to see it some distance, but how much to the acre I cannot say. I thought I could perceive the good effects for the first and second years; but the spot where the rock was burned was very visible for many years. Whether this effect was produced by the increased quantity of the fragments of the rock and lime, and the ashes from the wood used in burning the rock, or from the combined causes, I cannot say. Before the next season, my boat met with some accident, and thus ended my visions of enriching my plantation from lime. It is not necessary for me to say to the editor of the Farmer's Gazette, that lime, from the earliest agricultural records has been found a fertilizer or promoter of vegetation. The *modus operandi* of lime, gypsum and ashes is still I believe a debateable question. I have used all these in the same way and quantity by rubbing my cotton seed and seed corn before planting, with about equal success. In dry years the effect with me was visible in the color and increassed or hastened growth of the plant. In wet years I could not perceive the effects. The result of my limited reading and experience is that lime, gypsum, ashes and salt act as solvents of the atmosphere. I prefer wood ashes to either lime, gypsum or salt. Whether a more general, safer, and cheaper use of steam will ever enable boat owners to bring up lime and deliver it cheap enough for the Pee Dee farmers to use extensively, is a question for another generation or generations to decide. All I can say is, that inexhaustible beds of limestone exist on the banks of the Pee Dee, Black River, Santee and Savannah.

A PEE DEE PLANTER.

EXPERIMENTS TO SHOW THE PROPER STATE OF WHEAT FOR REAPING.

[At page 35, vol. ii., of the Farmers' Register, we presented at length our views and personal experience in regard to the advantage of reaping wheat before it is fully ripe. Our opinion has been settled on this still disputed point since 1821, and our practice made conformable to the opinion. Within that time, a very general change has taken place, by somewhat advancing the time of reaping. But still, there are but few farmers who will venture to reap as soon as the time we advocated, that is, when the grain is quite soft, or in the "dough state," or but just passed the previous "milky state;" and much loss is yet sustained by what remains of the old prejudice in favor of the wheat being "dead ripe." In the following article, from the last number of the British Quarterly Journal of Agriculture, (for June, 1841,) the writer has arrived at the same deductions that we did, by a different and more accurate course of experiment and calculation; and perhaps this different mode of treating the subject may aid the conviction of those yet in doubt. In this hope, we venture to present an article, of which the length and scientific form, we fear, may be repulsive to most readers, as the general taste of readers seems to be for mere *results*, rejecting all the steps of reasoning or evidence by which the results were reached, and by which the truth or falsehood of the conclusions might be judged.

What the writer calls the "raw" state of wheat, agrees with what we called the "dough" state, and recommended as the best for reaping. The interval of 14 days between that and the ripe state, which he found in the cool autumn climate of Britain, would not be more than half as long, and usually still less, in our hot and dry summer.—ED. F. R.]

In referring to his "*books*," during the commutation of the tithes in this parish, a very near connexion of mine (whose agricultural experience extends over a period of more than half a century, and who, when in the active management of land, was *locally noted* for producing good samples of wheat) showed me a list of all the corn he had produced and sold. Observing that the prices he had obtained for wheat were nearly always above those of the neighboring markets at the same time, he informed me that he was in the habit of commencing harvest a week or ten days before the generality of farmers, it being his practice to *reap his wheat before it became quite ripe.*

Thinking that custom must be the best guide on this point, and that age often looks upon the past, as youth upon the future, through a glass that invests objects and thoughts with a partial hue, this explanation did not make much impression upon me, till some months after (how many I cannot exactly say,) when I observed, from a

notice in the newspapers, that a certain learned professor had proposed reaping wheat *quite green*. The result was a determination to take the first opportunity of giving both systems a fair trial. Of this trial the following are the *details* and *results* :—

Having selected a field of "*old square-headed red wheat*" for the experiments, on August 4, 1840, I cut a sheaf. At this time it was quite green, *i. e.*, both straw and ears were in full vigor, and full of sap. Though the grain appeared perfectly formed, the chaff still adhered so firmly to it that it was scarcely possible to separate them by friction in the hands. When separated it was large and plump, but so full of milk that the slightest pressure reduced the whole to a juicy consistency or pulp.

This sheaf stood in the field for a fortnight, when it was housed. On the same day, August 18, I cut another. The wheat was of course yet "green," speaking positively, or "not ripe," if we speak negatively,—being what farmers commonly term "*raw*." That is, the straw, though appearing at a distance green, when examined closely was of a hue fast approximating to yellow; while, for about a foot upwards from the ground, it was *quite* yellow. The ears, too, were more open, the chaff tinged with various shades of yellow and green, and the grain itself, when separated, soft and pulpy, but not near so full of fluid as before. The judgment of the farmer will, however, best tell him the conditions of the wheat, both at this and at the preceding cutting, when I say, that in another fortnight the whole field was ripe. At the end of this fortnight (September 1) I housed the sheaf cut on August 18, and which had remained exposed to the weather in the interval, and cut a third. This I have said was "ripe ;" but by the term I don't mean that degree of ripeness when the straw breaks, the ears curl, and the grain shakes out ; but that condition in which it is customary to commence reaping it,—when the straw, from the roots to the ear, is uniformly yellow, and has lost all symptoms of vivid health.

On the 14th of September the third sheaf was taken from the field and carefully preserved, along with the other two, till the 1st of November, when, out of each sheaf, I selected 100 ears, and put each parcel into a separate bag. The straw from each of these parcels of ears was preserved carefully.

The ears in one bag (No. 1, or that cut very green) were now thrashed, the chaff carefully separated, and the gross weight of the corn yielded ascertained by an extremely accurate balance. The weights of a fixed measure of a certain number of grains were next found. *To avoid error, this was repeated several times.*

No. 2 (cut raw) and No. 3 (ripe) underwent the same process: for the results of which see the following table.

Comparative weights of wheat reaped at different periods.

Time of reaping and condition.	Gross produce.	Equal measure.	Equal No. of grs.
1. Aug. 4, (very green)	576	568	19 3-4
2. Ang. 18, (raw) . . .	736	580	23 1-4
3. Sept. 1, (ripe) . . .	650	570	22 3-4

As this table is merely comparative (the weights used being in parts, and decimal parts of the same, for the convenience of minute experiments,) it may not be unnecessary to give the following table of the absolute weights of each sample in ounces, drams, scruples, and grains Troy :—

	Gross produce.	Eq. measures.	Eq. No. of grains.
	oz. dr. sc. gr.	oz. dr. sc. gr.	o. d. s. gr.
No. 1,	4 0 0 0	3 7 1 13	0 1 0 5¾
No. 2,	5 0 2 13	4 0 0 13	0 1 0 17½
No. 3,	4 4 0 6	3 7 2 0	0 1 0 15¾

The straw belonging to each sample was now weighed (all the parcels having previously been made of the same length, commencing from the bottom of the ear), when the following was the result.

Comparative weights of 100 *straws, of equal length, belonging to the samples Nos.* 1, 2, *and* 3.

No. 1, (green,) = 550.
No. 2, (raw,) = 475.
No. 3, (ripe,) = 450.

The next thing to be ascertained was the quality of the produce, or the comparative worth of each description. Believing in the old saying, that

"The proper value of a thing.
Is just as much as it will bring,"

On the 5th of November I attended market, and asked the opinion of an extensive corn-grower as to the values of the respective samples, according to the prices of the day. His opinion was,

No. 1, . . . 61s. per quarter.
No. 2, . . . 64s. do.
No. 3, . . . 62s. do.

Putting the same samples into the hands of an extensive corn-factor and miller, his value, *and what he would give to buy*, was, for

No. 1, . . . 61s. per quarter.
No. 2, . . . 63s. do.
No. 3, . . . 61s. do.

Adding these values respectively together, and taking the mean price of each by which we shall obtain as near an approximation to the truth as possible), we have.

No. 1, = 61s. 0d. per quarter.
No. 2, = 63s. 6d. do.
No. 3, = 61s. 6d. do.

The loss or gain on these samples, by reaping at different periods, will be best seen from the following.

Table of the relative weights and value of wheat cut August 4, *August* 18, *and September* 1 ; *that cut last (or ripe) being taken as the standard, and unity assumed as its value in each column.*

	Weight of gross produce.	Weight of equal measures.	Weight of an equal number of grains.	Value.	Weight of the straw.
3, Sept. 1, (ripe,)	1	1	1	1	1
2, Aug. (raw,)	$1\frac{43}{323}$	$1\frac{1}{57}$	$1\frac{2}{91}$	$1\frac{4}{123}$	$1\frac{1}{18}$
1, Aug. (green,)	$\frac{288}{323}$	$\frac{284}{285}$	$\frac{79}{91}$	$\frac{122}{123}$	$1\frac{2}{9}$

According to this table, it is evident that the wheat reaped *a fortnight* before it was ripe has the advantage of the ripe in every point :

1st, In weight of gross produce $\frac{43}{325}$, or $13\frac{1}{5}$ per cent.

2d, In weight of equal measures $\frac{1}{57}$, or nearly $\frac{1}{2}$ per cent.

3d, In weight of equal number of grains $\frac{2}{91}$, or nearly $2\frac{1}{5}$ per cent.

4th, In quality and value $\frac{4}{123}$, or above $3\frac{1}{4}$ per cent.

5th, In weight of straw $\frac{1}{18}$, or above 5 per cent.

On the other had, that reaped *a month* before it was ripe, has an advantage of 22 per cent. in weight of straw, compared with the ripe, but in every other point has the disadvantage: thus,

1st, In weight of gross produce $\frac{37}{325}$, or $11\frac{5}{13}$ per cent.

2d, In weight of equal measures $\frac{1}{285}$, or rather more than $\frac{1}{3}$ per cent.

3d, In weight of equal number of grains $\frac{12}{91}$, or better than $13\frac{1}{6}$ per cent.

4th, In quality and value $\frac{1}{123}$, rather more than $\frac{4}{5}$ per cent.

It may be here necessary to mention that the sample No. 3 (ripe) was very bold, but *rather coarse*, feeling rough in the hand; while No. 2 (raw) was quite as bold, but *very fine and thin in the skin.* No. 3 (green) was also a good and clear sample, *but much smaller than either of the other.* This will account for the apparently anomalous fact of there being scarcely any difference in the marketable value of the *green* compared with the *ripe*, while there is a difference of 13 per cent. in favor of the ripe in weight of equal numbers of grains; for the sample being dry and good, the *buyer* lost little by this inferiority in the size of grain as the weights of equal measures were the same,—the difference of $\frac{1}{285}$ scarcely making $\frac{1}{2}$ lb. in the sack.

Before venturing to draw my deductions from these experiments, let us put their results in a still more practical point of view.

Suppose we have three acres of wheat, one of which, reaped when ripe, yields us 30 bushels of corn and one ton of straw; what will be the gross value of the same? And what the value of the other two acres, according to the data furnished by the foregoing experiments, supposing each acre to be exactly equal in crop, and the one reaped *a fortnight* and the other *a month* before the ripe?

Before answering this, we must fix a value for the straw—say 2d. per stone, which, taking into account that used by the farmer himself—and many cannot sell any—is as much as it is actually worth. Whence we have, for the acre of ripe.

30 bushels of wheat, at 61s. 6d. per quarter (the price of sample No. 3,)	£11	10	$7\frac{1}{2}$
1 ton of straw, at 2d. per stone, .	1	6	8
Gross produce,	£12	17	$3\frac{1}{2}$

Let us next take the acre cut "*raw.*" Before we can come to its value, we must first resolve the question, How much, in measure, will the acre produce us, supposing it to produce 30 bushels, if cut when ripe?

In solving this, as we must assume each crop to be exactly equal if cut at the same time, it is obvious that if we would determine the difference caused by reaping at an earlier period, we cannot found our calculations upon the *gross weight* of the two samples (Nos. 2 and. 3); for, although there is no doubt but that this weight was materially affected by the condition of the wheat at the time of reaping (indeed the difference in the weight of equal numbers of grains proves the fact), it is possible that, in selecting the 100 ears from the sheaf, I might take out of one sheaf ears with a greater number of grains in them than those taken out of the other. This, then, would affect the total or gross weight; and, therefore, it cannot be taken into account in the present case, where *both acres are supposed to have an equal number of grains.*

To the weight of equal measures, and of equal numbers of grains, both the result of many careful trials, this objection cannot be urged; and they are amply sufficient to enable us to tell the produce of an acre of "raw," when that of the "ripe" is 30 bushels. Thus, in the first table, we have.

	Wgt. of eq. measures.	Wgt. of eq. Nos. of grs.
No. 2 (raw,)	580 - -	23.25
No. 3 (ripe,)	570 - -	22.75

Now put m = this measure, and n = the number of grains weighed of each sort; then

$$n : 22.75 :: 1 : \frac{22.75}{n} =$$ the weight of one grain of No. 3, whence

$$\frac{22.75}{n} : 1 :: 570 : \frac{570n}{22.75} =$$ the number of grains of No. 3 in the measure m.

Again, similarly, $n : 23.25 :: 1 : \frac{23.25}{n}$, weight of one grain of No. 2, and

$$\frac{23.25}{n} : 1 :: 580 : \frac{580n}{23.25} =$$ the number of grains of No. 2 in the measure m.

And $m \div \frac{570n}{22.75} = \frac{22.75m}{570n} =$ the space occupied by one grain of No. 3 (ripe;) and

$m \div \frac{580n}{23.25} = \frac{23.25m}{580n} =$ the space occupied by one grain of No. 2 (raw.)

Now, as there are the same number of grains upon each acre, and as the acre of ripe yields 30 bushels, we have

$$\frac{22.75m}{570n} : \frac{23.25m}{580n} :: 30 \text{ bushels} : 30.1307313$$

bushels, the produce of one acre cut a fortnight before the ripe.

Again, by reference to page 27 in the second table, we have 1 and $1\frac{1}{18}$ as the relative weights of the straw No. 3 and No. 2; whence, as No. 3 is supposed to produce one ton,

$1 : 1\frac{1}{18} :: 160$ stones : $168\frac{8}{9}$ stones, the weight upon the acre reaped when raw. And for the whole produce of the acre, we have

30.1307 bushels of wheat, at 63s. 6d. per quarter, - -	£11	19	$1\frac{3}{4}$
168 stones of straw, at 2d. per stone, - - - - -	1	8	$1\frac{3}{4}$
	£13	7	$3\frac{1}{4}$

Adopting the same course for the produce of the

acre cut first, *i. e.* a month before the ripe, and which corresponds with sample No. 1, we get

$\frac{568\,n}{19.75}$ = the number of grains of the *green* in the measure m;

whence $\frac{19.75\,m}{568\,n}$ = the space occupied by one grain of green.

But (*vide* above,) $\frac{22.75\,m}{570\,n}$ = space by one grain of the ripe;

whence $\frac{22.75\,m}{570\,n} : \frac{19.75}{568\,n}$ :: 30 bushels : 26.1356 bushels, the produce of the acre cut *a month* before the ripe. And (*vide* "Table of relative weights," &c., page 27.)

1 : $1\frac{2}{9}$ :: 160 stones : $195\frac{5}{9}$ stones of straw, the produce of the same; whence we have

26.1356 bushels of wheat, at 61s. per quarter, - - - -	£9	19	$3\frac{1}{4}$
$195\frac{5}{6}$ stones of straw, at 2d. per stone, - - - - -	1	12	7
	£11	11	$10\frac{1}{4}$

The total products of the three acres stand thus:

No. 3, Reaped when ripe, .	£12	17	$3\frac{1}{2}$
No. 2, do. a fortnight earlier, .	13	7	$3\frac{1}{2}$
No. 1, do. a month before the ripe,	11	11	$10\frac{1}{4}$

Showing a *loss* of £1 : 5 : 5, or about 10 per cent., by cutting very green; and *a gain of* 10s. *per acre*, or nearly 4 per cent., by reaping in a raw state, or a fortnight before it was ripe.

From the above details, it would appear that it is the farmer's interest to cut his wheat before it becomes thoroughly ripe. Many, no doubt, will be disposed to doubt deductions of such importance drawn from such limited experiments. This objection the writer anticipates, because it is a natural one, which he felt himself, when he considered the most important conclusions which resulted; when, however, he retraced, *step by step, his investigations, without any variation in that result*, he could no longer refuse to believe it true till he proved it untrue. He is aware that there are other points of consideration in this subject—that there are peculiarities in the nature of land, of seed or of season, and that there is, as in all man's investigations, a *possibility* of error; any of which circumstances might materially affect the result of experiments upon so limited a scale as the present one; and for this reason he will, if all be well, give the subject a trial in the ensuing harvest, on a much more comprehensive scale. That the results of *these* experiments will be corroborative in the main points, he has no doubt, and for this cause he feels no hesitation in laying the preceding "details" before the agricultural world; moreover, as he has in no case given a deduction without the grounds upon which it rested, the degree of "acceptation" which the reader may give it rests with himself. The most sceptical, he however flatters himself, will think it "worthy" of *being tested*, if of nothing more.

In testing, however, the conclusion which the foregoing experiments warrant, there are some other advantages which strengthen that conclusion, which must not be forgotten. That they have not been considered in the preceding pages, is not because they are of no import, but, on the contrary, because they are of such consequence that the writer could not assign them *an adequate momentary value*. And had he attempted to do so, he would have at once made the details of his experiments valueless, by mixing the real results of *practice* with the imaginary ones of opinion. Before the subject, however, can be thoroughly sifted, they must be considered. The circumstances are these:—independently of the 4 per cent. gain (according to the foregoing experiments) by reaping our wheat a fortnight before it is ripe, we have

1*st*, Straw of a better quality.

2*d*, A better chance of securing the crop; and,

3*d*. A saving in securing it.

1*st*, "Straw of a better quality." This is easily demonstrated both for the purpose of food and manure.

As an article of food the value of any vegetable depends upon the gross quantity, or upon the combination of certain substances termed soluble, from their entering into union with water. This rule applies particularly to the grasses which are used for the purpose of feeding stock.* The substances generally found in these grasses are saccharine matter or sugar, mucilage or starch, and gluten or albumen, and bitter extract and saline matters. Of these the sugar is no doubt the most, and the extractive matter the least, nutritive; the latter having been found, by experiment, to come away in the dung of the animal consuming it, while the o her matters were absorbed by the body.

Now wheat is a species of grass, and the value of the straw, as an article of food, depends upon the quantity of nutritive matter contained in it. "This nutritive matter must be very small in straw, as now generally used," the practical farmer will say, "for straw *per se* is but poor food, and scarcely able to sustain life." This is true; from 400 grains of *dry* barley straw," says Sir H. Davy, "I obtained 8 grains of matter soluble in water, which had a brown color, and tasted like mucilage. From 400 grains of wheaten straw, I obtained 5 grains of a similar substance." With this paucity of nutritive matter in the *straw* before us, how can we account for the fact that, in the sap of wheat, the straw, and in all succulent plants, there is *naturally a great proportion of mucilaginous and saccharine matter*?† The answer is this. In all grasses and succulent plants, the greatest proportion of this is present before the flower is dead ripe.‡ So in wheat, when we allow the straw to remain till thoroughly ripe, a portion of the sugar is converted by the action of

* "The mode of determining the nutritive power of grasses by the quantity of matter they contain soluble in water, is sufficiently accurate for all the purposes of agricultural investigation." Sir Humphry Davy in his "Account of the Results of Experiments on the produce and nutritive qualities of different grasses and other plants, instituted by John, Duke of Bedford."

† "The fluids contained in the sap-vessels of wheat and barley afforded, in some experiments which I made on them, mucilage, sugar, and a matter which coagulated by heat." Sir H. Davy, Agricul. Chem. 142.

‡ *Vide* Agricul. Chem. Sec. 6, p. 264.

light, heat, &c. into mucilage,* and a great proportion of the nutritive powers of the grass absorbed by the atmosphere, or lost in some manner; for, as Mr Sinclair observes, in his "*Report of Experiments on Grasses*," "there is a great difference between straws or leaves that have been dried after they were cut in a succulent state, and those which are dried (if I may so express it) by nature while growing. The former *retain all their nutritive powers*, but the latter, *if completely dry, very little, if any.*"

As a manure, too, the straw cut "*raw*" is equally superior to the ripe; for, as it is an agricultural axiom that the better the food of an animal is, the better the manure from it, the manure from a stock consuming this straw, *containing a fair proportion of nutritive matter*, must be more valuable than that from stock consuming the ripe with *scarcely any in it.*

But a great proportion of the farmer's straw is converted into manure without undergoing the process of mastication and digestion. For this purpose the unripe straw is equally preferable, as all *unripe vegetables are manures without preparation*†—the soluble and nutritive extracts which they contain, being the principal agents in forming vegetable manure; as they not only combine to render the process of decomposition the more rapid, by breaking down the woody fibres,‡ &c. in the manure heap, but are also in their pure and separate states stimulants to vegetation.§

* The inferiority of the quantity of sugar in the summer crops, probably depends upon the agency of light, which tends always in plants to convert saccharine matter into mucilage. Ibid. p. 414.

† "Green crops, or any kind of fresh vegetable matter, require *no preparation to fit them for manure.*

"All green succulent plants contain saccharine or mucilaginous matter, with woody fibre, and readily ferment. They cannot, therefore, if intended for manure, be *used too soon* after their death.

"When green crops are to be employed for enriching a soil, they should be ploughed in, if it be possible, when in flower; for it is at this period that they contain the largest quantity of soluble matter, and that their leaves are most active in forming nutritive matter." Sir H. Davy, Agricul. Chem. p. 264.

‡ "Vegetable manures, in general, contain a great excess of fibrous and insoluble matters, which must undergo chemical changes before they can become the food of plants. It will be proper to take a scientific view of the nature of these changes, &c.

"If any *fresh vegetable matter*, which contains *sugar, mucilage, starch, or other of the vegetable compounds soluble in water*, be moistened and exposed to air, at a temperature from 55° to 80°, oxygen will soon be absorbed, and carbonic acid formed; heat will be produced, and elastic fluids, principally carbonic acids, gaseous oxide of carbon, and hydrocarbonate, will be evolved; a dark-colored fluid, of a slightly sour or bitter taste, will likewise be formed; and if the process be suffered to continue for a time sufficiently long, nothing solid will remain, except earthy and saline matter, colored black by charcoal.

"*In proportion as there is more gluten, albumen, or matters soluble in water*, in the vegetable substances exposed to fermentation, *so in proportion*, all other circumstances being equal, *will the process be more rapid.*" Ibid. p. 257.

§ "*Mucilaginous, gelatinous, saccharine, oily, and extractive fluids*, and solution of carbonic acid and water, are substances that, *in their unchanged states, contain almost all the principles necessary for the life of plants.*" Ibid. p. 256.

It may be urged that the increased value of the straw is more in favor of that cut very green (No. 1) than that cut a fortnight later (No. 2.) This is true; but, to produce this increase of value, if we cut our wheat so early as No. 1. we have a *desiccation of the grain to such an extent as to diminish the measured produce above* 12 *per cent.;* while, by reaping with No. 2, we are, so far from injuring either sample or measure, actually improving both, and at the same time *gaining* above 5 per cent. in the weight, and at least as much in the quality of the straw. For the increase of weight in the latter is not produced by a greater produce, but by the presence of a greater portion of those soluble substances which are alike necessary to animal and vegetable life—are alike the nutritive part of food and the quickening principle of manure.

2*d*, We come now to the second advantage, the "*better chance of securing* the crop."

This is self-evident. We gain a fortnight at the commencement of harvest. If the weather be good, we can secure a great portion of our wheat before we should scarcely have begun upon the old system. If not, we can wait; so, under any circumstances, our chances of securing the grain must be greater. Moreover, if we take a retrospect of the harvests for a number of years, we shall find that nearly all the early harvests have been what we term "good" ones, *i. e.* good as regards weather and the condition in which the grain was secured. When the peculiarities of our climate, its general fickleness, and its still greater liability to change as the autumn advances, are considered, this will require no explanation.

If we look, too, at the later harvests, we shall, I venture to say, find that, in nine cases out of ten, the grain which was cut first was secured in the best condition. As an example of this, the crop of 1839 will suffice. The crops were late, the beginning of reaping the same, and the result was that in the north of England *full* 75 *per cent. of the whole wheat crop was damaged.* And full 75 per cent. of that which *was uninjured*, I will also venture to say, was that which was cut the first. In Yorkshire this was especially seen; for the *earliest wheat* was with the greatest difficulty secured. In this village (North Deighton) not a sheaf was in stack till the day before, and on some farms, the *very day* on which the rainy weather set in.

The frequent recurrence of such years as this, will teach the value of even a fortnight better than any thing that can be said here. And that they will recur is beyond a doubt. What has happened *once* may happen again, but what has frequently happened, (as this sort of harvest has,) with the same causes in operation, we are warranted in saying, *will* happen again and *often.*

3*d*, The *saving in securing* the crop is a double one. In the first place, there is less waste in moving or reaping, and no danger of "shaking" or "necking" in strong winds. In the second place, there is an absolute economy in the expense of reaping the crop, which may be thus illustrated.

The busy period of harvest with the farmer generally extends over four or five weeks. In this month a certain portion of his work is done by his own hands, *i. e.* by the regular laborers and

servants of the farm; therefore, by beginning a fortnight sooner, and extending the season of harvest over six weeks instead of four, it is evident that these regular servants would cut a much greater proportion of his crop—in fact *one-half more*. By this he is rendered less dependent on those extraneous "*helps*" or "*takers*," who, in the seasons of hurry and anxiety, fix their own terms.

How often do we, especially in the north, behold a force of reapers in almost every field. The reason is this: the wheat, oats, and barley, are often ripe at one time, and aware as the farmer is of the injury which strong winds and showers would do them, he has to hunt up laborers at any price. And, after all this extra expense, it is extremely probably that, having the whole of his harvest upon his hands at once, he is compelled to let some part of his grain have *too little* or some *too much* weather. By commencing his wheat harvest a fortnight earlier, these evils would have been prevented; by the time that his barley and oats were ready, most or all of his wheat would have been cut, and some of it fit for the stack, and that, too, by the exertions of his regular workmen only. And being neither pressed for time nor laborers, his harvest would have been finished at a less expense, and his grain secured very probably in a much better condition.

To assign a value for these advantages is, as has been said before, for *the farmer himself*; and it will not be an insignificant one. For if beginning harvest a fortnight earlier enables him to save a crop from spoiling once in a lifetime,—if the improved quality of his straw as food for his stock allows him to plough out an acre more, or to pasture another acre of clover with feeding stock, instead of mowing it for his lean stock, every *grain saved, every extra bushel of corn produced, and every extra head of stock fed*, is a benefit to the whole community as well as to himself—is so much added to the gross produce and wealth of the country. There being, in fact, an *increased return without an increased outlay*.

BONE-DUST.

From Jackson's Treatise on Agriculture.

Bones, which have now become a very important manure, are composed of earthy salts, chiefly phosphate of lime, with a little carbonate of lime, phosphate of magnesia, and about one-half of decomposable animal matter. Those of fat young animals are allowed to be the best.* They are less beneficial for clay lands than light soils, and less efficacious in wet than in dry seasons. In the improved districts of Scotland, bone-dust is coming into very general use as a manure for turnips, and mills for crushing bones are general in many parts of the country. There has been no improvement in Scottish agriculture so universally adopted as that of applying bone-dust to land intended for the production of turnips, and it seems better qualified than any manure hitherto tried for bringing waste land into cultivation. It is light, and can be carted to a great distance at little expense, one wagon load of 100 bushels being found nearly equal to 40 cart-loads of farm-yard manure. It is asserted by some, that its efficacy remains during the whole rotation, and even after it. On pastoral farms it will be found exceedingly useful; as, raising a better crop of turnips, it will greatly improve the condition of the stock.

In corroboration of the above remarks, we quote the following:—"A farmer obtained a forty years' lease of a tract of poor land in a high situation near Rochdale in Lancashire, on which, after fencing and draining, he erected a bone-mill, and began manuring the land at the rate of from 100 to 130 bushels per acre. The consequence of this was, that he let off, in a few years, more land than paid the rent of the whole, and retained a large farm in his own hand."*

In the wolds of York and Lincoln shires, it is stated that "before bones were extensively used in turnip husbandry, many thousands of acres were annually sown for that crop without any manure whatever. The turnips upon such unmanured land were consequently very indifferent, and the benefit of feeding sheep on their tops was very trifling. But since the use of bones has become general, the turnip crop has increased tenfold. All the succeeding grain crops have been much larger, and upon the four or five shift system, there is no doubt the land will go on progressively improving, requiring a less quantity of bones annually, from its increased fertility and power."†

From experiments made regarding the efficacy of bone-dust contrasted with farm-yard dung, on soils of a light sandy nature, the result has been uniformly in favor of the first, one and a half tons of bones being equal to twenty tons of dung. To ascertain the effects of large and small quantities, from 20 to 100 bushels per acre, in various amounts, have been applied, and it has been found that the crops are not increased when laid on beyond a certain quantity. By being applied in large quantities, although not immediately beneficial, bone-dust has been found to render land extraordinarily productive for a great length of time. We quote the following rules for its application:—

"1. On dry lands, limestone, chalk, light loams, and peat, bones are a highly valuable manure. 2. That they may be applied to grass with great good effect. 3. That on arable lands, they may be laid on fallow for turnips, or used for any other subsequent crops. 4. That the best method of using them when broad-cast, is previously to mix them up in compost with earth, and let them lie and ferment. 5. That, if used alone, they may be either drilled with the seed or sown broadcast. 6. That bones which have undergone the process of fermentation, are decidedly superior in their immediate effects to those which have not been fermented. 7. That the quantity should be about twenty bushels of dust, or forty of large bones, increasing the quantity if the land be impoverished. 8. That upon clays and heavy loams,

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* The following table gives the ordinary proportions of the ingredients composing bone-dust:—

Earthy and saline matter -	40	parts in 100.
Cartilage and jelly - -	40	
Fatty matter - - -	20	

* Journal of Agriculture.
† British Husbandry.

it does not yet appear that bones will answer. On this latter observation, however, a farmer near Nantswich in Cheshire remarks, that he 'occupies a farm in the township of Pickmore, the soil of which is a clay loam scarcely twelve inches deep, the subsoil a gray sand mixed with coarse clay, on a bed of good clay marl. Two years ago he covered a field with bone manure, previous to which the grass was so sour as not to be worth ten shillings an acre; but it is now full of most excellent herbage, consisting of white clover, and trefoil.' To this he adds, 'that on another of this fields with a clay soil, a small portion of it was manured thirty-two years ago by a former tenant with bones, and that although it has been twenty years in tillage, yet that part still shows a superiority over the rest.' At Clumber Park, the seat of the Duke of Newcastle, 600 bushels of small bones were in 1822 spread upon 24 acres of grass land in the dairy farm, consisting of dry, sandy, and gravelly soil, which had been laid down about ten years. Their effect upon the pasture improved the condition of the cows so materially, that about twice the quantity of butter was made from them than from cows grazed on land of a similar quality, but not boned; and this effect, it is said, still continues. The time for laying them upon the land as a top-dressing to grass, whether seedling or pasture, is generally recommended to be early in spring. Seeing that the fertilizing quality of bones is improved by fermentation, it has led to the supposition that they may be usefully applied in compost with earth and other substances; by this mixture it has been found from experiment that they soon become decayed and pulverized. It is stated in the Doncaster Report, 'that this method of using bones in the formation of composts is recommended by several intelligent farmers, thirteen of whom, solely from their own experience, described its effects as superior to those of bones used singly. With some of these, it is the practice to mix fifty bushels of bones with five loads of burnt clay or good earth per acre, by which dressing, the crops between fallow and fallow, except clover, appear to be increased one-fifth in value."*

RED CLOVER, ETC., IN FRANCE.

[Translated from Le Bon Jardinier, for the Farmers' Register.]

Trifolium pratense, red clover. The plant mostly in cultivation on the natural meadows of France is the trefoil, owing, without doubt, to the facility with which it is brought into the rotation of three years, without deranging the order, a practice still generally followed, and under which system, it is said, this plant has rendered and still renders more service than any other, in contributing to the suppression of the effects of the fallow year, and in showing that the land can be entirely renovated by a productive year for clover. But it is to be regretted that this mode of using the clover is not replaced by another less defective; for the lands where they remain, with only a single year's rest for a long time, must wear out. Clover delights in soils new and deep; it succeeds on clay lands suitably manured, and pretty well on those of a sandy nature, if the land does not fire it. It is most generally sown in the spring, on the oats and barley, and frequently on the green wheat; sometimes in the autumn; but that season suits only where the land is in fine heart, and where the frosts will not disturb it. When it is sown on crops already up, and it is wished not to harrow it, a time should be chosen when there is a prospect for rain. Great care should be taken to cover the grain very lightly, on account of its extreme fineness. The pasturage of clover charged with dew and moisture is very dangerous, as well as that also which is cut and fed green. It should only be given to the cattle when sufficiently cured. Plaster is excellent manure for this plant. The quantity of seed to an acre is about 16 pounds; but the practice in different places is very various on this point. In one place they put only three or four pounds, in another twenty, and sometimes more. Gilbert has taken the average of a great many cantons which he has found to be fifteen and a half pounds to the acre.

Trifolium repens, white clover. The species is hardy, and very well adapted to the pasturage of sheep. It is sown in some parts of Germany to mow; but its produce in this manner is very inconsiderable. White clover grows well on light and dry lands, and can be employed very usefully there. It will grow also on moist lands. I have seen it very fine on meadows so moist that the *fétuque flothante*, [cat-tails, I believe] grew there in abundance. It requires about twelve pounds of seed to the acre.

*Melilot de Sibérie, Melilotus alba.** Many plants of this species have often been tried for forage, without any being yet established in culture. Even the Siberian melilot, so beautiful, so vigorous, and so luxuriant, notwithstanding the commendations of Daubenton, and of our celebrated Andre Thouin, has not come into general use. Its stalks, too succulent when young, and too hard when more advanced, render its conversion into forage difficult and not advantageous. Its use as pasture would be best, but the want of precaution and vigilance causes the melilot to be more dangerous than trefoil or lucerne. Cattle permitted to graze upon it after a rain, or before the rays of the sun have dispelled the humidity of the dews, swell, and often perish. Melilot is biennial, and can be introduced into the rotation of crops as trefoil; it grows more readily than that on indifferent and dry lands. One reason why it should be cultivated is, that it affords bees, from its numerous flowers, an abundant pasture, which they seek with avidity. Sow from twelve to fifteen pounds to the acre.

TO THE FRIENDS OF A NATIONAL AMERICAN SOCIETY OF AGRICULTURE THROUGHOUT THE UNITED STATES.

From the National Intelligencer.

Fellow-Citizens:—The object of the present address is to ascertain whether there is, at this time, a sufficient number of the friends of this great measure in our Union willing to lend their

* British Husbandry.

* Is this the plant of which two of your correspondents lately wrote?—*Tr.*

We presume it is, or one of the varieties.—Ed. F. R.

influence to warrant the call of a primary meeting to organize such an institution. Should the indications appear favorable, a committee of the friends of the cause will take upon themselves the responsibility of naming a time and place for the meeting.

We earnestly hope that some of you will promptly lend your own names, and procure a few others in your vicinity of such persons as desire to promote American Husbandry: and that you will transmit them by mail in time to reach Washington by the 10th of August, addressed to H. L. Ellsworth, esq., Commissioner of Patents, for Solon Robinson.

We remain, fellow citizens, your agricultural friends and humble servants,

SOLON ROBINSON, of Indiana.
JAMES M. GARNETT, of Virginia.

July 24*th*, 1841.

DISPUTED QUESTIONS IN AGRICULTURE.

To the Editor of the Farmers' Register.

August 2*d*, 1841.

Dear sir:—It may perhaps be deemed a very useless, if not presumptuous, attempt in any individual to suggest any means of settling for ever even a small portion of those apparently interminable controversies in regard to certain agricultural matters with which our agricultural papers have been and still are often filled. But the very circumstance of their being continued is, I think, a conclusive proof that each disputant believes that they *may* be brought to a conclusion, provided a proper course was pursued for the purpose. In the hope therefore of recommending such a course, I will proceed to notice a few of these controversies, together with the manner in which the questions that gave rise to them have been treated. This has been such, in most instances, as to serve scarcely any other purpose than to crowd our books of husbandry with communications, the authors of which appear far more anxious to put each other in the *wrong*, than to set the agricultural public *right*, in regard to the subjects of controversy. The effect of most of these articles has been to aggravate the unreasonable prejudices against agricultural works; to perplex greatly all young farmers who read for information; and immeasurably to weary old ones, in witnessing such a waste of words—uttered, professedly, to give light, but, in reality, often making confusion worse confounded. Instead of giving us accurate details of experiments, most carefully made, together with their results, which alone can satisfactorily settle such matters, we find, in much of what they write, little else than speculative opinions and theoretical arguments, or ill-digested and unsound conclusions from some things which they call experiments, but which are really deficient in all the particulars that it is essential to notice most accurately, before they can be entitled to any weight.

This, I think, may truly be affirmed of nearly all that I have read of what has been written on the following controverted subjects:

Whether vegeto-animal manures should be turned under in their freshest state, or left on the surface of the land, until it is cultivated?

Which is the most productive variety of Indian corn in each section of country, where the climate, soil, and situation is nearly the same?

At what distances is it best to plant, and by what modes of culture corn will produce most net profit?

Whether it is injurious or beneficial to cut the roots of corn, during its growth?

And last, though not least, what is the true opinion in regard to that great "*pons asinorum*" in agriculture, the *convertibility of wheat into cheat or chess*?

Now, in my humble opinion, all these still undetermined questions might have been settled many—many years ago, if those who were most interested in them had taken the trouble to make a few such perfectly accurate experiments as any cultivator of his own or others' land might very easily make; and to publish the results of the same, in our agricultural journals, instead of the numerous vague speculations and inconclusive statements on the foregoing subjects, with which these journals have so often been filled. Whether I am right or wrong in this opinion, let your readers determine, after considering the following queries to which I respectfully invite their attention.

How easy would it have been, in order to settle the first controversy, for all who felt sufficient interest in it to desire that it should be settled, to spread vegeto-animal manure equally, over a small determinate quantity of land, and then, alternately to plough it under, and leave it on the surface of exactly equal portions of this land, and to compare, by accurate measurement, the produce of each portion?

Would it not have been equally easy to settle the second controversy, by planting a like determinate quantity of land with as many varieties of Indian corn as the experimentalist wished to compare together, giving to each exactly equal portions of the land, the same distances between the hills and rows, the same number of stalks in a hill, and precisely the same culture; and then accurately to measure the produce of each portion? To prevent this produce from being much affected by intermixture, an oblong form might be given to the land on which the experiment was made, and the rows planted across, to the number, say, of 12 or 15. Then, by comparing an equal number of the middle rows only, the experiment would approach sufficiently near absolute accuracy to satisfy even the most sceptical.

To ascertain the best distances at which to plant corn in the richest, the poorest, and the medium quality of land, what difficulty would there be in trying all such as are most approved by practical men, on an ascertained quantity of land of either of the foregoing qualities, giving to each distance exactly the same sized portion, and then measuring accurately the produce of each portion, as in the other experiments?

With a view to ascertain the best modes of culture, can it possibly be satisfactorily done without comparing them at the same time, on exactly equal portions of land which is the same in soil, fertility, and situation; and can there be any great difficulty, expense or trouble in making this comparison. Yet who, among our numerous writers on the subject, has ever reported any such

experiment? This, if it ever had been properly made, would have settled for ever, whether it benefits or injures corn to cut the roots, since *cut they will be*, more or less, by every mode of culture which has ever yet been tried. If the portion of land on which fewest roots had been cut produced the most corn, and that portion yielded the least where the root-cutting had been greatest, then surely the first mode of culture would be preferred by every body, but the obstinate fools who have no better reason for any thing they do, than that they have always done the same.

With respect to the cheat or chess controversy, I am almost afraid to open my lips, for most of our brethren who maintain that cheat is the produce of wheat, seem to have worked themselves up into such a choleric and bellicose humor on the subject, against us who maintain the negative in this matter, that it is quite a perilous thing to offer any argument in support of our opinions. I will therefore content myself with only asking a few simple questions. Is it among the unknowable things of this world to ascertain the truth in regard to this controversy? If it is, why should another word be ever said, or written about it? If it is *not*, can any one oblige me so far as to name a single experiment, among all which have been so called and stated as proofs that wheat will turn to cheat, which is not most palpably defective in several essential particulars? I can truly say that I have never seen even a solitary *one*, but that which was made in 1833 by Messrs. Thomas and William J. Cocke and yourself. This is to be found in the first volume of your Register, on the 83d and 84th pages; and to my mind is most conclusive proof, that for *wheat to produce cheat*, is quite as great an impossibility as for "thorns to yield grapes," or for thistles to produce figs. I will farther ask, if any experiment made with *less* particularity and accuracy than the one just referred to, ought to be regarded, even in the slightest degree, as contributing towards settling this much and long agitated controversy, or indeed, should be entitled to a place in any of our agricultural papers? None, I think, who really desire to come at the truth in this matter could reasonably object to the editors of these papers requiring equal or even greater accuracy and minuteness in the experiments which they may be required to report for either of the parties concerned. If the zeal of those who maintain the affirmative in this controversy, be not sufficient when stimulated by the hope of victory, to impel them to take the trouble of making such experiments as have just been suggested, I would beg leave hereby to call their attention to your pledge—made a few months ago, to pay one hundred dollars—not "in rags," but in good lawful money, to any one who can prove by similar experiments, well authenticated in all their particulars, that he has succeeded in converting *wheat into cheat*.

I could mention several other subjects upon which much difference of opinion has been expressed, for many years past, and which still occasionally appear in our agricultural papers. Serving no other purpose than to show the great disproportion in number between the multitude who prefer writing out and publishing their conjectures on these topics, and the few who choose the less easy, but more troublesome road of accurate experiments to solve their doubts. But until this be generally done in regard to all matters which *can* be settled by the experimental process, the readers of our agricultural journals (good as I admit most of them to be) will have to pay for much that affords them little, if any satisfactory information. If "*action, action, action,*" be essential to form the finished orator, I would say that—*experiments, experiments, accurate experiments* are equally, nay, more important, to form the complete farmer. I remain, dear sir, yours very sincerely,

JAMES M. GARNETT.

THE CANKER-WORM.

From the Albany Cultivator.

Newport, Feb. 28, 1793.

Hon. Justin Ely, esq.—I was the last evening favored with yours of the 14th inst. "It is with real pleasure I communicate to you, sir, the information I have had of the efficacy of quicksilver in destroying the canker-worm, so destructive to our apple trees. Having been informed of an instance in which the trial had a complete effect, I was induced to examine into the facts personally. I waited upon the gentleman who had declared the success of his experiment:—A Mr. McCurrie, a gentleman who owns and improves a good farm on this island,—a man of good observation, an excellent farmer, and on whose credit the utmost reliance may be had. He had several orchards, but the one the experiment was made in was an old orchard of very large trees. Nine trees, the most central in the orchard, he bored with a spike gimlet about four or five feet from the ground, an inch and a half or two inches into the tree, rather slanting the boring downwards. He procured an ounce of quicksilver from an apothecary—half an ounce he inserted into one of the trees, a quarter of an ounce he inserted into three trees in equal quantities, and the other quarter of an ounce as equally as he could, he divided into five other trees. He then plugged up the holes tight. This was done, I think, in December. Some weeks after, he took out the plugs, and found the quicksilver in the same state he had put it in. He again plugged up the holes, and some time after the sap of the trees had begun to ascend, he again took out the plugs and found the quicksilver was gone, leaving behind something like the slime of a snail. The worms came as they had done the year before, and totally destroyed all the verdure, &c., of all the trees except those nine, which were in as good order as ever they had been, and yielded their common plenty of apples, about one hundred bushels. The boughs of some of the nine trees interlayed, and were interwoven with the branches of the other trees; and he said the fruit upon them was equally good, while the branches of the other trees so interwoven amongst them, appeared as though they had been fired. The trees with the least quantity of quicksilver were equally protected or preserved, as the one which had half an ounce. He inserted the quicksilver with a quill open at one end and the side of it cut

in the manner we make a pen, the more readily to let the quicksilver into the quill.

As to the Palmer worms, I know nothing of them; he made no complaints of them. If they are a worm which always follow the other, they might have been equally affected. It seems the quicksilver might have been diffused by the sap to the very extremes of all the ramifications of the trees.

I should think it may not yet be too late to try the experiment, though I should prefer the latter end of January or beginning of February, for inserting the quicksilver. Perhaps credit might be given to the effect of such an experiment, by reasoning from the effect which mercury has upon the human body. But I leave that province to others, whose professions, and abilities are more adequate to the undertaking; ever preferring facts to theory, and that humble track to the labyrinths of fancy and imagination. At any rate, facts and successful experiments are most encouraging to the farmer, who ought to be led by a certainty of success or gain, as too many can illy bear unsuccessful labor or expense. I have heard of an attempt of the like kind as the foregoing, made without success; but this was attributed to an improper time of inserting the quicksilver, viz. in June.

HENRY MARCHANT.

OF THE MOISTURE OF THE SOIL.—WATERING.

From Lindley's Horticulture.

It has already been shown that water is one of the most important elements in the food of plants, partly from their having the power of decomposing it, and partly because it is the vehicle through which the soluble matters found in the earth are conveyed into the general system of vegetation. Its importance depends, however essentially upon its quantity.

We know, on the one hand, that plants will not live in soil which, without being chemically dry, contains so little moisture as to appear dry; and on the other hand, an excessive quantity of moisture is, in many cases, equally prejudicial. The great points to determine are, the amount which is most congenial to a given species under given circumstances, and the periods of growth when water should be applied or withheld.

When a plant is at rest, that is to say, in the winter of northern countries and the dry season of the tropics, but a small supply of water is required by the soil, because at that time the stems lose but little by perspiration, and consequently the roots demand but little food; nevertheless, some terrestrial moisture is required by plants with perennial stems, even in their season of rest, because it is necessary that their system should, at that time, be replenished with food against the renewal of active vegetation: hence, when trees are taken out of the earth in autumn, and allowed to remain exposed to a dry air all the winter, they either perish, or are greatly enfeebled. If, on the other hand, the soil in which they stand is filled with moisture, their system is distended with aqueous matter at a time when it cannot be decomposed or thrown off, and the plant either becomes unnaturally susceptible of the influence of cold in rigorous climates, or is driven prematurely into growth, when its new parts perish from the unfavorable state of the air in which they are then developed. The most suitable condition of the soil, at the period of vegetable rest, seems to be that in which no more aqueous matter is contained than results from the capillary attraction of the earthy particles.

Nevertheless, there are exceptions to this, in the case of aquatic and marsh plants, whose peculiar constitution enables them to bear with impunity, during their winter, an immersion in water; and in that of many kinds of bulbs, which, during, their season of rest, are exposed to excessive heat. The latter plants are, however, constructed in a peculiar manner; their roots are annual, and perish at the same time as the leaves, when the absorbent organs are all lost, so that the bulb cannot be supposed to require any supply of moisture, inasmuch as it possesses no means of taking it up, even if it existed in the soil. This will be again adverted to in a future chapter.

It is when plants are in a state of growth that an abundant supply of moisture is required in the earth. As soon as young leaves sprout forth, perspiration commences and a powerful absorption must take place by the roots; the younger the leaves are, the more rapid their perspiratory action; their whole epidermis must, at that time, be highly sensible to the stimulating power of light; but as they grow older their cuticle hardens, the stomates become the only apertures through which vapor can fly off, and by degrees even these apertures are either choked up, or have a diminished irritability. As a general rule, therefore, we are authorized to conclude that the ground should be abundantly supplied with moisture when plants first begin to grow, and that the quantity should be diminished as the organization of a plant becomes completed. There are, however, some especial cases which appear to be exceptional, in consequence of the unnatural state in which we require plants to be preserved for our own peculiar purposes. One of the effects of an extensive supply of moisture is to keep all the newly formed parts of a plant tender and succulent, and therefore such a constant supply is desirable when the leaves of plants are to be sent to table, as in the case of spinach, lettuces, and other oleraceous annuals. Another effect is, to render all parts naturally disposed to be succulent much more so than they otherwise would be; thus we find market-gardeners deluging their strawberry plants with water while the fruit is swelling, in order to assist in that, to them, important operation. While, however, in this case, the size of the fruit is increased by a copious supply of water to the earth, its flavor is, in proportion, diminished; for, in consequence of the rapidity with which the strawberry ripens, and, perhaps, the obstruction of light by its leaves, the excess of aqueous matter taken into the system cannot be decomposed, and formed into those products which give flavor to fruit; but it must necessarily remain in an unaltered condition.

It is for the reason just given, that the quantity of water in the soil should be diminished when succulent fruit is ripening; we see this happen in nature, all over the world, and there can be no doubt of its being of great importance. Not only is the quality of such fruit impaired by a wet soil, as has just been shown, but because of its low

perspiratory power the fruit will burst from excess of moisture, as occurs to the plum and grape in wet seasons. The melon, although an apparent exception to this rule, is not really so; that fruit acquires its highest excellence in countries where its roots are always immersed in water, as in the floating islands of Cashmere, the irrigated fields of Persia, and the springy river-beds of India. But it is to be remembered that the leaves of this plant have an enormous perspiratory power, arising partly from their large surface, and partly from the thinness and consequent permeability of their tissue, so that they require a greater supply of fluid than most others; and, in the next place, the heat and bright light of such countries are capable of decomposing and altering the fluids of the fruit with a degree of rapidity and force to which we can here have no parallel. In this country the melon does not succeed if its roots are immersed in water, as I ascertained some years ago, in the garden of the Horticultural Society, by repeated experiments. Melons were planted in earth placed on a tank of water, into which their roots quickly made their way; they grew in a curvilinear iron hot-house, and were trained near to the glass, and consequently were exposed to all the light and heat that can be obtained in this country. They grew vigorously and produced their fruit, but it was not of such good quality as it would have been had the supply of water to the roots been less copious. Thus, in the tropics, the quantity of rain that falls in a short time is enormous; and plants are forced by it into a rapid and powerful vegetation, which is acted upon by a light and temperature bright and high in proportion, the result of which is the most perfect organization of which the plants are susceptible: but, if the same quantity of water were given to the same plants at similar periods in this country, a disorganization of their tissue would be the result, in consequence of the absence of solar light in sufficient quantity.

The effect of continuing to make plants grow in a soil more wet than suits them is well known to be not only a production of leaves and ill-formed shoots, instead of flowers and fruit, but, if the water is in great excess, of a general yellowness of appearance, owing, as some chemists think, to the destruction by the water, of a blue matter which, by its mixture with yellow, forms the ordinary verdure of vegetation. If this condition is prolonged, the vegetable tissue enters into a state of decomposition, and death ensues. In some cases the joints of the stem separate, in others the plant rots off at the ground, and all such results are increased in proportion to the weakness of light, and the lowness of temperature. De Candolle considers that the collection of stagnant water about the neck of plants prevents the free access of the oxygen of the air to the roots; but it seems to me that much more mischief is produced by the coldness of the soil in which water is allowed to accumulate. It seems also probable that the extrication of carburetted hydrogen gas is one cause of the injury sustained by plants whose roots are surrounded by stagnant water; but upon this point we want much more satisfactory evidence than we yet possess.

It is because of the danger of allowing any accumulation of water about the roots of plants that drainage is so very important. In very bibulous soils this contrivance is unnecessary; but in all those which are tenacious, or which, from their low situation, do not permit superfluous water to filter away freely, such a precaution is indispensable. No person has ever seen good fruit produced by trees growing in lands imperfectly drained; and all experienced gardeners must be acquainted with cases where wet unproductive borders have been rendered fruitful by contrivances which are only valuable because of their efficiency in regulating the humidity of the soil. Mr. Hiver (*Gard. Mag.* v. 60) speaks of the utility of mixing stones in great quantities with the soil, "as they prevent the accumulation of water in very wet weather, and retain sufficient moisture for the purposes of the plant in dry seasons;" and, when we hear of such precautions as are detailed in the following good account of preparing a vine border we only learn how important it is to provide effectually for the removal of superfluous water from around the roots, and how useless a waste of money is that which is expended in forming deep rich beds of earth.

"In preparing a vine border," says Mr. Griffin, of Woodhall, a successful grower of grapes, "one foot in depth of the mould from the surface is cleared out from the whole space; a main drain is then sunk parallel to the house, at the extremity of the border, one foot lower than the bottom of the border; into this, smaller drains are carried diagonally from the house across the border. The drains are filled with stone. The cross drains keep the whole bottom quite dry; but if the subsoil be gravel, chalk, or stone, they will not be necessary. The drainage being complete, the whole bottom is covered with brick, stone, or lime rubbish, about six inches thick, and on this is laid the compost for the vines." (*Hort. Trans.* iv. 100.)

The practice of placing large quantities of potsherds or broken tiles at the bottom of tubs, or pots or other vessels in which plants are rooted, is only another exemplification of the great necessity of attending to the due humidity of the soil, and to the prevention of stagnant water collecting about the roots; and the injury committed by worms, upon the roots of plants in pots, is chiefly produced by these creatures reducing the earth to a plastic state, and dragging it among the potsherds so as to stop up the passage between them and destroy the drainage.*

One of the means of guarding the earth against an access on the one hand, and a loss on the other, of too much water, is by paving the ground with tiles or stones; and the advantages of this method have been much insisted upon. But it is certain that, in cold summers at least, such a pavement prevents the soil from acquiring the necessary amount of bottom heat; and it is probable that, what with this effect, and the obstruction of a free communication between the at-

* [*Glazed* flower-pots are totally unfit for most plants, except with the most careful attention to drainage, and even then they are much inferior to common unglazed ones. The latter permit the excess of water to escape through their porous sides, which is impossible in the glazed pot; in which, if the aperture at the bottom become stopped, the earth is sodden with water, the plant suffers and soon perishes. A. J. D.]

mosphere and the roots of a plant, the practice is disadvantageous rather than the reverse.

More commonly recourse is had to the operation of simple watering, for the purpose of maintaining the earth at a due state of humidity, and to render plants more vigorous than they otherwise would be; an indispensable operation in hot-houses, but of less moment in the open air. It is, indeed, doubtful whether, in the latter case, it is not often more productive of disadvantage than of real service to plants. When plants are watered naturally, the whole air is saturated with humidity at the same time as the soil is penetrated by the rain; and in this case the aqueous particles mingled with the earth are very gradually introduced into the circulating system: for the moisture of the air prevents a rapid perspiration. Not so when plants in the open air are artificially watered. This operation is usually performed in hot dry weather, and must necessarily be very limited in its effects; it can have little if any influence upon the atmosphere: then, the parched air robs the leaves rapidly of their moisture, so long as the latter is abundant; the roots are suddenly and violently excited, and after a short time the exciting cause is suddenly withdrawn by the momentary supply of water being cut off by evaporation, and by filtration through the bibulous substances of which soil usually consists. Then again, the rapid evaporation from the soil in dry weather has the effect of lowering the temperature of the earth, and this has been before shown to be injurious (p. 113); such a lowering, from such a cause, does not take place when plants are refreshed by showers, because at that time the dampness of the air prevents evaporation from the soil, just as it prevents perspiration from the leaves. Moreover, in stiff soils, the dashing of water upon the surface has after a little while the effect of "puddling" the ground and rendering it impervious, so that the descent of water to the roots is impeded, whether it is communicated artificially or by the fall of rain.* It is, therefore, doubtful whether artificial watering of plants in the open air is advantageous, unless in particular cases; and most assuredly, if it is done at all, it ought to be much more copious than is usual. It is chiefly in the case of annual crops that watering artificially is really important; and with them, if any means of occasionally deluging ground can be devised, by means of sluices or otherwise, in the same way as we water meadows, it may be expected to be advantageous.* Mildew, which is so often produced by a dry air acting upon a delicate surface of vegetable tissue, is completely prevented in annuals by very abundant watering.† The ravages of the *botrytis effusa*, which attacks spinach; of *acrosporium monilioides*, which is found on the onion; and the mildew of the pea, caused by the ravages of *erysiphe communis*, may all be stopped, or prevented, by abundant watering in dry weather. Mr. Knight first applied this fact to the securing a late crop of peas for the table, in the following manner:—

The ground is dug in the usual way, and the spaces which will be occupied by the future rows are well soaked with water. The mould upon each side is then collected, so as to form ridges seven or eight inches above the previous level of the ground, and these are well watered; after which, the seeds are sowed, in single rows along the tops of the ridges. The plants very soon appear above the soil, and grow with much vigor, owing to the great depth of the soil and abundant moisture. Water is given rather profusely once in every week or nine days, even if the weather proves showery; but, if the ground be thoroughly drenched with water by the autumnal rains, no further trouble is necessary. Under this mode of

* [No error is more common in this country than *surface-watering* newly transplanted trees; and we do not hesitate to affirm that full one half the failures, in our dry summers, arise from this injudicious practice. By pouring water daily on the top of the ground, under a powerful sun and strong wind, the surface becomes so hard that access of the air to the roots is almost precluded; and the water rarely penetrates more than a couple of inches: while the operator imagines he is supplying the thirsty roots with abundant moisture, he is doing them an injury by the application of a very transient stimulus, which is followed by an increased sensibility to the drought. In late spring planting, it is always preferable to *water abundantly* in the hole, while planting the tree, before filling in the upper layer of soil. This will in most cases suffice, until the tree becomes sufficiently established by the emission of new rootlets to support itself; and also serves to ensure its growth by filling up all the small hollows around the lesser fibres. In seasons of continued drought, when it becomes absolutely necessary to water flagging trees, two or more inches of the surface soil should always be removed, the trees watered copiously, and the earth replaced before the surface dries. This will prevent evaporation and the encrusting of the ground, and the moisture will be retained for a much longer period.—A. J. D.]

* ["In the vicinity of Liegen (a town in Nassau,) from three to five perfect crops of grass are [annually] obtained from one meadow; and this is effected by covering the fields with river water, which is conducted over the meadow in spring by numerous small canals. This is found to be of such advantage, that supposing a meadow not so treated to yield 1000 lbs. of hay, then from one *thus watered* 4–5000 lbs. are produced. In respect to the cultivation of meadows, the country around Liegen is considered to be the best in all Germany." *Liebig, Organ. Chem.* p. 105.—A. G.]

† [The mildew which attacks the young fruit of the foreign grape, when reared in the open air, is one of the most troublesome to the cultivator in this country. An effectual remedy is the flowers of sulphur dusted over the bunches with a dredging-box (or the solution applied with a syringe,) when the grapes are of the size of small peas. But the most certain prevention of this, as well as most diseases to which plants are subject, consists in keeping the vines in a thrifty and vigorous condition. The first crop or two of a young thrifty vine is almost invariably fine and free from mildew; but every subsequent year (if the common mode of pruning is followed,) as the plant grows older, the proportion of fair fruit is smaller, until at last nothing but shrivelled and mildewed bunches are seen. By *laying down* half of the long shoots of each vine annually, thus forming new plants, and never allowing the same to bear more than two years, a full crop, free from rust or mildew, may be obtained annually. Even the finer native sorts, as the Isabella, are sometimes liable to mildew on old vines: when this occurs, they should be headed back, to bring up a supply of young wood, and plentifully manured. The young and thrifty shoots will then have sufficient vigor to withstand the attacks of the mildew, to which the enfeebled fruit produced from the old wood is so liable.—A. J. D.]

management, the plants will remain perfectly green and luxuriant till their blossoms and young seed-vessels are destroyed by frost, and their produce will retain its proper flavor, which is always taken away by mildew. (*Hort. Trans.*, ii. 87.)

SAVING GRASS SEEDS.

From the Kentucky Farmer.

Mr. Editor:—During the first and second years of the publication of your valuable journal, there appeared in it several articles recommending to farmers in Kentucky, the policy and propriety of saving our own grass seeds, and the best mode of doing it, especially of saving clover seed. As I had felt the annual purchase of grass seeds a heavy tax, I was encouraged by your articles to make the experiment of saving my own, and I have been entirely successful. For the want of other means, in saving timothy, orchard grass, and blue grass seeds, I used the common grain cradle, with the fingers set a little closer to the scythe than for cutting wheat. The cradler makes his stroke, then holding the cradle with his right hand gathers the straws (which are cut above the blades) with his left, until a handful is gathered, when it is dropped, and bound in small bundles: one binder to two cradlers; the bundles are shocked without capping, and remain until they receive three or four rains, after which, when entirely dry, they are moved to a floor and trodden out by horses, or thrashed on a sheet and fanned with a common wheat fan, by turning it very slow. Blue grass seed may be cleaned, after being trodden, by rubbing it through a common meal sifter; and is worth twice as much prepared in this way as the stripped seed is, because each seed falls separate in sowing. The seed thus saved from good grass, will generally sell for more than would the hay from the same ground. After thus cutting off the seed the hay may be mowed in the usual way. The best instrument for *saving clover seed* is also in the hands of every farmer, viz.: the *scythe*, to be used as follows: mow, or graze off close and clean, a thick set, smooth clover field, about the first of June, (not later than the tenth,) take all stock off, and it will spring up immediately with a fine growth of short straw with many heads well filled with seed. When the leaves begin to die, and the heads have generally turned brown, (which is generally about the middle of July,) put in all your scythes of a damp day, or dewy morning; cutting close to the ground. Let one hand to two mowers follow immediately with a rake, and rake into small piles of size convenient to be thrown with a pitch fork into your wagon; let it remain in these piles until it takes three or four good rains; after it is dry it may be hauled in, the wagon passing between two rows of piles, with one hand to throw from each side, and one to tread it in the wagon. A wagon body with side boards, thus filled will make about half a bushel of clean seed. A moderate treading or flailing will separate the heads from the straw, which last may be raked out; after which the clover is ready for sowing in the chaff; and sowed at the rate of a bushel and a half to the acre, is as good, if not better than clean seed. If you wish to clean it, keep putting down and raking out straw until the floor is about three inches deep with heads and bowls; tread with six or eight horses one day, and fan out by turning a common wheat fan slowly; then tread two days more, and fan out again, and pass the whole through a meal sifter. These last operations are laborious, disagreeable and tedious, and should be performed in dry cold weather. From about sixteen acres thus managed, year before last, I saved enough seed in the chaff to sow about one hundred acres for myself, and sold sixty-seven dollars' worth of clean seed. For the last four years I have sold all these varieties of seeds, besides having enough to sow bountifully for myself, and this last is one of the greatest advantages of saving your own seeds, as they thus cost you but little you sow more bountifully, which is abundantly repaid by heavier crops of grass. I believe a bushel of clean seed to five acres is nearer the proper portion than a bushel to ten acres. I have sown a large field with clover, timothy and orchard grass in the following proportions for ten acres: one bushel of clover, one of timothy, and six of orchard grass seed. I find it an admirable mixture, either for mowing or grazing, and though very thick, still it is not too much so.

In conclusion, it is but justice to say that I think the articles in your paper, above alluded to, have been the chief causes of my saving and making enough by grass seeds, to pay for all four of my agricultural papers as long as I live.

ROBERT W. SCOTT.

Locust Hill, near Frankfort,
July 20, 1841.

MODES OF TRANSMUTING WHEAT TO CHEAT.

From the Cultivator.

Mr. N. Sutherland, a stanch believer in the conversion of wheat into chess, gives the following methods by which that conversion may be effected. As the most of them are not difficult of trial, perhaps some may have the curiosity to prove them; and by performing the feat, entitle themselves to Mr. Ruffin's premium:—

"Wheat may be transmuted into chess by taking a few heads at harvest, and laying them on the ground to grow where they will not be disturbed, the land to be rather poor; or some heads may be taken that are scattered at harvest in the stubbles and grow, taking them up late in the fall, and setting them in a wheat field; or some wheat may be put in a dish, and wetted and dried as it is sprouting several times, and it will come up chess; or it may be fed or mowed off when eight or nine inches high; any of these methods will change wheat to chess. There is another cause that is frequently operative, and that is the frequent freezing and thawing of the surface in moist lands, which, by drawing the roots partly out of the ground, so injures the plant that it cannot produce wheat."

[We thank Mr. Sutherland for thus descending from loose generalities to particulars, and pointing out so many different and easy modes by which

wheat may be converted to cheat. We trust now that believers will try some of the most easy and sure of these experiments; and then, (if Mr. S. is right,) the difficulty will not be to find some one entitled to our offered premium of $100, but who shall *first* present and *prove* his claim. We very readily abide the issue. All the steps of several of the modes of experiment indicated above are susceptible of the *clearest proof;* and all we require is that *full proof* of the facts shall be made out and exhibited.—Ed. F. R.]

EXPERIMENTS ON NITRATE OF SODA AND SALTPETRE. BY W. STRATFORD DUGDALE, M. P.

From the Journal of the Royal Agricultural Society of England.

Many communications having been forwarded to the society on the value of saltpetre and nitrate of soda as manures, perhaps the result of an experiment I have made upon two fields of wheat, eight miles distant from each other, may not be uninteresting. One field is of a light gravelly soil, which was manured with a coat of marl in the autumn before the wheat was sown. The other field is of a stiff clayey soil, and was manured with lime in the autumn. About the middle of last April I measured off three quarters of an acre in the field of gravelly soil, and sowed one quarter with saltpetre, one with nitrate of soda, and left the remaining quarter with nothing but the marl.

I also measured off four quarters of an acre in the clayey field, and sowed one quarter with saltpetre, one with nitrate of soda, one with soot, and left the remaining quarter with lime only. In both cases the quantity of saltpetre and soda was as one hundred weight to the acre. In the gravelly field the produce of the quarter of an acre with nitrate of soda was, of—

Wheat . . . 13 bush. 2 pecks, weighing 63 2-3 lbs. per bush.
Straw . . . 9 cwt. 72 lbs.
Chaff and waste, 2 qrs. 27 lbs.
Saltpetre,—
Wheat . . . 10 bush. 2 1-2 pecks, w'ging 64 1-4 lbs. per bush.
Straw . . . 8 cwt. 56 lbs.
Chaff and waste, 3 qrs. 24 lbs.
Marl only,—
Wheat . . . 10 bushels 2 pecks, weighing 64 lbs. per bush.
Straw . . . 8 cwt. 54 lbs.
Chaff and waste, 1 cwt.

In the clayey field:—The produce of half an acre, manured with—

	Bsh.	pk.	lbs.
Nitrate of soda, wheat . .	18	1	weighing 64 per bush.
Do. with saltpetre . . .	17	2	63
Do. with soot	17	1	63 1-3
Do. with lime only . .	16	0	62 2-3

In this experiment my bailiff did not measure the quantities of straw and waste.

I also sowed some soda and saltpetre, to the same amount per acre, on some grass-land.

I was not at home when the hay was cut; but am informed that the crop was greatly increased, particularly by the nitrate of soda.

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2. *Trial of nitrate of soda. By Joshua Rodwell, esq.*

1839, July 12.—1 cwt. per acre upon lucerne, after the first mowing, the first year. Benefit not equal to the cost, and much inferior to the same cost in soot, by which it was tested: the soot at 8*d.* per bushel.

July 20.—1 cwt. per acre upon beet-root; every alternate stetch 6 acres. Hoed in with the second hoeing. Benefit not equivalent to the cost; scarcely apparent, except in the color of the leaves.

July 26.—1 cwt. per acre for Swedish turnips; part after the first, and some after the second hoeing. 4 acres. The effect scarcely apparent; by no means equal to the cost.

July and August.—1 cwt. per acre for white turnips, in every stage of their growth after being well up, before and after hoeing. No benefit.

1840, May 23.—1 cwt. per acre upon pease, 2 acres; barley, 2 acres; wheat, 2 acres. Benefit not equivalent to the cost, but the greatest upon the barley.

N. B. The white clover after the barley failed where the nitrate was used.

June 1.—Wheat, 2 acres; barley, 10 acres. 1 cwt. an acre. The barley increased in quantity equal to the cost, but layer not so good as where no soda was sown; the wheat increased in quantity, but not equal in quality. I have since found that the layer of white clover is almost destroyed.

N. B. In the above the experiments are made upon dry soils, with sand, sandy loams, and crag subsoils, and the lands in the common course of husbandry. The nitrate of soda 26*s.* per cwt.; and expenses of carriage and sowing 2*s.* per acre: and the experiments tested by very close observation, but not in weight or measure.

Alderton Woodbridge, May 10, 1841.

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3. *Trials of nitrate of soda. By Charles Newman.*

To the secretary—sir,—I am induced to offer you a few observations and a statement of the result of my experiments on nitrate of soda, as though not extensive, they may tend in some degree to confirm the interesting reports on the same subject in the last and former numbers of the Society's Journal. The first trial I made of it was in 1839, on wheat, oats, and grass; as far as the eye could discover, each of them made a very satisfactory progress in a few days after it was applied. Thus encouraged, I determined to make another trial, on a larger scale, the following year. I purchased my nitrate of soda at 21*l.* per ton, including cartage, and used it on all my crops:—

1. On part of a field of barley; in which I could perceive but little difference, the whole of the field being a heavy crop, and much laid.
2. On clover; the result was the same, which I attributed to the high condition of the land.
3. On spring-tares: two weeks after they were up the crop increased considerably, and was cut green for the horses.
4. On meadow: not quite so satisfactory as in the former year; this I considered arose also from the high condition of the land.
5. On wheat: this was an exceedingly thin crop, produced by the unfavorable autumn, the land being so wet when the seed was sown that half of it rotted; indeed the plant was so thin that I had determined to plough it up, but considered it an excellent opportunity to try the merits of the nitrate. Having

sown it on a part of the field, I was much surprised at seeing not only the wheat improve, but also the wire-weed, which continued to increase up to the time of harvest, and was so strong as to render reaping difficult. Considerably more than a load of this weed to the acre was left on the land. I mention this circumstance merely to prove the power of the nitrate to force even weeds, the natural produce of the soil, when the corn is not sufficiently thick on the ground to take up its nutritive properties.

6. On a field of oats which had been under the process of draining, but where, in consequence of a continuation of rain, the operation had been suspended for a considerable time; the land, being continually saturated, was much out of condition. This I considered an excellent opportunity for experiments. In six days after the nitrate was sown it began to surpass the other part of the field, and continued to do so until harvest.

On each of the two last crops I housed and thrashed, separately, one acre that was sown with nitrate, and one that was not so sown, and I found the result as follows:—

	bl. pk.		bl. pk.	£. s. d.
One acre of wheat sown with nitrate of soda . . .	20 0			
One ditto without . . .	14 3	Increase	5 1 at 8s. 6d. per bushel	2 4 7½
	truss.		truss.	
Ditto straw with nitrate .	72			
Ditto without	51½	Increase	20½ at 11d. per truss	0 18 9½
				3 3 5
Expense of nitrate and sowing				1 7 0
Profit on nitrate per acre of wheat				1 16 5

	bl. pk.		bl. pk.	
One acre of oats sown with nitrate of soda . . .	60 3			
Ditto without . . .	46 0	Increase	14 3 at 3s. 6d. per bushel	2 11 7½
	truss.		truss.	
Ditto straw with nitrate .	120			
Ditto without . . .	84	Increase	36 at 10d. per truss . . .	1 10 0
				4 1 7½
Expense of nitrate and sowing				1 7 0
Profit on nitrate per acre of oats				2 14 7½

By this statement it will be seen that the increase on the wheat and on the wheat-straw is more than one-fourth; on the oats nearly the same, and on the oat-straw almost one-third.

In my experiments the nitrate of soda was only beneficial on land that was out of condition; if this should prove to be its general character, it will indeed be a valuable auxiliary as a top-dressing in the spring. There are but few farmers who have not a small portion of their land to which it may become useful. You are aware that a very great breadth of land in this island requires a stimulus to produce even a moderate crop, while, to land which is naturally fertile and in a high state of cultivation, such assistance would prove injurious.

I purpose using a greater quantity of nitrate this season, with a view of trying its properties; and as it is very important not only to know how far it may prove beneficial to the first crop, but to examine the state of the land in the following season, I trust every member who may have the opportunity will not fail to make a report accordingly. CHAS. NEWMAN.

Court Farm, Hayes,
March 13, 1841.

MORE DISPUTES AMONG THE SELLERS OF BERKSHIRE HOGS.

From the Kentucky Farmer.

The following, over an anonymous signature, is from a farmer of Bourbon, whose proper name Mr. Bement has no right to know, since he has chosen to recognize him under his fictitious one. But we intend no offence to Mr. Bement (as it would be no compliment to X. Y. Z.) when we say that, whatever may be the standing of Mr. B. in New York, that of X. Y. Z., to say the least, is quite as respectable in Kentucky.

In relation to the matters in controversy, we wish it understood we shall take no other part than that which we deem will be of justice and impartiality to the parties. The controversy, we hope, if continued, will dip deep into the true merits of the several varieties of swine, so that our readers may derive some useful information from it.—ED. K. F.

Bourbon county, July 24, 1841.

To the editor of the Kentucky Farmer—I have read in your last number a letter addressed to you by Mr. C. N. Bement, from near Albany, New York, in which he charges a correspondent from New York, 'X. Y. Z.,' with incorrectness; as he did not examine his hogs. Mr. B. would fain make your readers believe that my statements were incorrect. It was not my design to convey the idea that I had examined all the inferior lots of Berkshire hogs in the vicinity of Albany. No, they were such as had obtained celebrity abroad and favor at home, that I had designed to examine,

and of which I have written. The information given to me in New York in relation to Mr. Bement's hogs was such that I had no desire to see them. Whether or not injustice has been done him I cannot determine. Mr. B. wishes the devil to have his due. Surely he is as much entitled to it as any other individual, but not more than his advocates. I leave him and Mr. Lossing to settle the matter as to the size of their hogs; and there is no doubt he will inform Mr. B. by what system of breeding he has obtained those large Berkshires, that Kentucky farmers so justly prize. Your correspondent does not think it requires great acumen to discover the difference between the large and the small Berkshires. The dissimilarity is so great that any one at all acquainted with them can immediately detect each kind. If he will examine Lossing's piggery he will readily perceive the difference. He says in England they know of but one variety. Should Mr. B. pay a visit to Kentucky he will find four varieties, viz.: the large black Berkshire of Lossing, a white Berkshire imported by Letton, and another by Dr. Martin, and the small Berkshire purchased of C. N. Bement by Mr. Letton; all of which are apparently of very different breeds, but all claiming to be Berkshires.

As to large Berkshire sows being more prolific, B. says is all a fol de rol. I suppose the English of that is, it is all a lie. Now he proves by his own statements that it is true. He remarks it is not unfrequent for sows of this breed (and he states his are as large as Lossing's) to have from 12 to 16 pigs, and in one instance as high as 18 living pigs at one litter. Mr. B. says your correspondent omitted to inform you how many pigs from these great litters are raised. That, sir, is not my *look out;* all depends upon the attention the sows receive at pigging. In answer to Mr. B.'s charge that your correspondent would fain make the public believe that they (McFerren's hogs) were all purchased of Lossing, that charge is entirely gratuitous. I was informed that the most of them were either purchased of Lossing or descendants of his stock. Be that as it may, no censure can rest upon

X. Y. Z.

NOTES ON SANDY POINT ESTATE. NO. III.

To the Editor of the Farmers' Register.

Sandy Point, July 10th, 1841.

In "Notes on Sandy Point Estate, No. 1," it was stated that "all of the soil of the arable land was susceptible of the highest degree of improvement, and that, in its original and virgin state, it must have been highly productive." From a severe system of cropping, close grazing, and little attention to manuring, for a long succession of years, its original fertility has been greatly reduced. For the past 10 years, efforts have been made to restore to the soil a portion of its lost fertility; little grazing has been permitted, during that period, on any portion of the estate now under tillage. Clover has been extensively and successfully cultivated, and returned to the soil as a manuring; and considerable attention has been paid to the collection and application of putrescent manures; the results, however, of the general application of this latter manure have proved but little satisfactory. For 10 years, prior to 1840, all of the manure which could be collected from the stables, winter farm yards, &c., up to the first of March of each year, was applied to the field to be planted in corn; all made in the subsequent spring months was piled up and allowed to rot and ferment until the spring of the following year, when it was also applied to the corn crop. For the number of years during which the application was made of the winter collected manure, consisting chiefly of unrotted and nearly entire corn-stalks, straw, shucks, &c. Mr. Bolling is of the opinion that little or no benefit was derived by the corn crop to which it was applied, and that from its coarse texture it formed a serious impediment in the after cultivation of the crop. The following wheat crop derived as little benefit as did the preceding corn crop. So far as I have seen this mode practised, my own opinion and experience coincide with that of Mr. Bolling. From the application of rotted manure to a corn crop, I have seen decided benefits; but from the usual mode in which it is piled up and unprotected from the influences of the hot summer's sun, drying winds and washing rains, and from becoming fire-fanged or moulded, a very large proportion of manure thus piled up becomes a mass of dry, worthless vegetable fibre, scarcely worth the expense of hauling out, and can impart benefit to no crop. Such a mode is, at best, especially in a climate such as this, a most injudicious and wasteful one; a very large bulk of manure is lost, and so far from its strength becoming concentrated, all its gaseous, if not all its fertilizing properties are lost, and there is little left to compensate for the loss of bulk, labor, and time occupied in piling it up, and hauling and spreading it on the soil. From my own experience I have found the application of recent or unrotted manure to clover the best and most profitable application of it: laying it on early in the spring, when the leaves of the clover speedily cover and protect the manure. While the clover derives much benefit from this top-dressing, its greatly increased growth, well ploughed under in proper season, proves an excellent manuring, either for a wheat fallow, or ensuing corn crop. Last year (1840) the manure on this estate was applied as follows, 60 cart-loads of rotted manure were applied as a top-dressing on wheat, in January of that year. Nearly all of this was stable manure, and almost entirely covered with white mould. Little if any benefit resulted from the application. 316 loads of rotted cow-yard manure of the preceding spring were applied to an oat fallow. This was also very much moulded. Very little benefit was observable either to the preparatory oat or following wheat crop, as compared with that on which no manure had been applied. 959 loads, also of rotted mixed manure, being a pile of the preceding year's accumulation, was applied to corn ground. Much of this was also moulded; the bottom of the pile, being generally under water, was free from mould, and good. From this application the corn derived considerable benefit. 3070 loads of unrotted or recent manure from the stable and cattle yards were applied on clover intended for a wheat fallow, and also on clover intended for the corn crop of this present year. When applied on clover for wheat fallow no lime or calcareous matter had been applied to the soil. A small proportion of

that intended for corn had been limed. In both cases the increased growth of clover and weeds plainly exhibited the benefits of the application, as did also the improved crop of wheat this season, distinctly marking the limits of the manuring, as does also the now superior growth of young clover. So far as the corn crop has yet progressed, there is an evident improvement in its growth, as compared with that on similar soil on which no manure had been applied; but not as yet so decided or obvious as on the wheat crop. When prevented from hauling out all the manure collected during the winter and early spring months, prior to the middle of April, I have repeatedly applied it to clover, together with all collected during summer, so late in the season as the months of August and September, on young clover with very evident benefits. In this case no piling up was resorted to; leaving the accumulation of manure in the yards, to lay with a surface as little broken as possible, and protected by a covering of straw or other coarse litter, and keeping it as much as possible saturated with water. By this mode manure will be prevented from becoming moulded, decomposition will progress slowly, comparatively little bulk will be lost, and little if any of its fertilizing properties. So far as my observation and experience have led me in this climate, the application of all putrescent manure to young clover, is the most economical and profitable application that can be made of it. And the less the degree of fermentation which has taken place previous to its application the better. When unrotted straw, cornstalks, shucks, &c., have been applied to a good stand of clover, early in the spring, I have never experienced any difficulty in ploughing them under in the fall or winter months, and have generally found them almost entirely decomposed. When not completely covered and protected by a full growth of clover and weeds, decomposition will progress more slowly; the underlaying soil will however derive considerable benefit, but not equal to that derived from an increased growth of clover, when applied to that valuable fertilizer. In future years it is contemplated that this will be the general mode of applying all putrescent manures on this estate, securing first a good stand of clover. I have invariably found clover manured in the spring to withstand the summer droughts of this climate much better than that on which no such application had been made; and as the increased breadth of land rendered calcareous by the application of lime or marl progresses, a preference will be given to soils which have received such applications, and on which manures will doubtless prove the most profitable.

The ploughing under of green crops (other than clover) for manure has been only recently attempted here; experience has yet to test their value. No doubts however are entertained as to their profit and utility. Pine leaves applied to limed soils have here proved beneficial.

Before the year 1831 very little lime had been used on any portion of the estate; and from that period up to the beginning of 1840, 170 acres on the Rowe farm, 260 on Teddington, and 90 on the Neck farm, equal in all to 520 acres, had received a dressing of oyster shell lime, at a rate per acre varying from 90 to 120 bushels, or in all, as near as can now be ascertained, equal to 3000 hogsheads of shells. The annual applications were given to the fields planted in corn; and selecting the poorest or least productive portions of these fields, and consequently on detached portions of each farm. The benefits resulting from the application have been most decided; the increased growth of weeds, clover, corn and wheat, point out each application as distinctly as if each were separately fenced off. The increased products on these particular spots have not been accurately ascertained or noted; but when, by the eye comparing them with surrounding land not limed, the increase is not less than double in corn and threefold in wheat and clover, and gives ample encouragement to persevere in its application. In addition to the above quantities of shell lime used during the period above mentioned, from 1000 to 1200 bushels of marl were brought over from the opposite side of the river, in Surry county, where there are extensive deposites of marl, and were applied to a corner of a field on Teddington. The quantity of lime contained in the marl was not known, nor is it now recollected how much was applied per acre; supposed to have been a slight dressing; and as probably all of the corner of land so marled, from its near vicinity to several houses, has had ashes applied to it occasionally, it is doubtful how much improvement may justly be attributed to the application of the marl. The crop of clover on it of this season is equal, if not superior, to that on adjoining limed land.

In 1840 the purchase of calcareous matter was largely entered into on this estate. 76 hhds. of oyster shells were purchased at 75 cents per hhd., $57.00, and 1962 hhds. at 70 cents, $1373.40, in all 2038 hhds., costing $1430.40. In addition to these, 90 casks of northern stone lime were purchased, costing 90 cents per cask, $81.00; and early in the season, a contract was entered into for a supply of 40,000 bushels of marl, from a bank on the Surry side of the river, distant about 7 miles, for 4 cents per bushel, and of which 20.000 bushels were delivered during the year, making the cost of marl for the year $800.00; and in all, for marl, stone lime and shells, a total of $2311.40. Of the above quantities not more than 300 hhds. of shells were burned, and applied to the soil in 1840, at the rate of from 100 to 120 bushels per acre, all of the stone lime at the rate of 60 bushels per acre, and 5200 bushels of marl, at the rate of 130 bushels per acre. (A large application of lime and marl was made early this year, and which will be referred to in a subsequent communication.) The above quantity of marl will appear to many a very slight application. When the contract was entered into, the contractors stated the strength of the marl to be 85 per cent. of lime; and no doubt they were correct, so far as a particular selected specimen was concerned; but not so as regards the general body of marl, which, from subsequent analysis, proved to be only $\frac{63}{100}$. Our subsequent applications have consequently been increased so as to give upwards of 100 bushels of lime per acre; the object for the present being to give as large a surface as possible a speedy dressing. Improvement to the soil will in the meantime be progressing; and an increased application will immediately follow. Considering the facilities, which the deposite of marl presents

from which this supply is obtained, for digging, the short distances it has to be lightered, as also the facilities afforded for speedily discharging a cargo, on various points of the estate, 4 cents a bushel may justly be considered a high price for this marl. The then existing circumstances which induced the contract, however, justified the giving of that price, rather than suffer disappointment by not obtaining a necessary supply in due season. The same marl, of equal quality, and from the same deposite, is now offered at a reduced price.

The application of shell lime on this estate is very expensive. The wood necessary for burning the shells has to be carted a distance of from two to three miles; and it is estimated that each bushel of lime, when ready for application to the soil, costs not less than 12 cents per bushel; and it is also estimated that an equal quantity of lime per acre will be furnished from marl at $\frac{60}{100}$, costing 3 or 3½ cents per bushel at about one-third the expense of shell lime. It is in contemplation to discontinue the use of the latter here beyond the supply of shells now on hand, and use the marl in preference, if it shall be found, after a fair trial, to act equally well on the soil, and marl of that strength can continue to be procured, in sufficient quantities for the demands of the estate, at not more than 3 cents per bushel.

A dressing of calcareous manure was given to a twenty-acre lot previous to planting corn in 1840. On one half of the lot shell lime was applied at the rate of 100 bushels per acre; on the other half marl at the rate of 130 bushels containing $\frac{63}{100}$ of lime. The crop of corn was much injured by the ravages of the cut worm. Until late in June no difference was observable on the crop between the shell lime and marl, nor was any observed on the succeeding crop of wheat, recently reaped; and the young clover now stands equally well over the lot.

On another portion of land, of little over 12 acres, immediately in front of Teddington barn, after a dressing of rotted manure, shell lime, at the rate of 120 bushels per acre, was applied previous to planting corn, also in 1840. This portion of ground, though of fine texture of soil and well located for receiving occasional aid from manure, had failed comparatively for several years to produce a crop of either corn or wheat. The crop of corn last year was judged to be equal to 30 or 35 bushels per acre, and the crop of wheat reaped this season as being not less than 15 bushels per acre. The benefits to this portion of ground have consequently been highly satisfactory; the stand of young clover is now very fine.

In preparing the corn field on the Neck farm in 1840, 20 acres on one side of the field, considered as being too poor to produce a crop of corn, had a dressing of manure from the stable yard applied to it, and a crop of oats sown. This crop resulted miserably, not even sufficient to cover the ground; what was of them were ploughed down soon after ripening, and from which a scanty volunteer growth presented itself. In the fall, previous to sowing wheat, 15 acres of it received a dressing of shell lime at the rate of 100 bushels per acre. On the 7th November wheat was sown on the portion limed, as also on that not limed, and which had the equal benefit of manure, and on a portion of it a tolerable crop of pea vines ploughed under. The adjoining land, which had been in corn, and separated only by a water furrow, was also sown on the same day. From the earliest stage of the growth of the wheat, that on the limed portion kept far in advance. The crop reaped from it this season was heavy, and considered to be equal to 25 bushels per acre; while that on the portion of the 20 acres not limed has certainly not produced an average of more than five bushels per acre, and was considered as being formerly the best portion of the 20 acres, all of which previous to liming would not probably have produced an average of 4 bushels. The crop of wheat from the adjoining land which had been in corn, and formerly considered as being greatly superior to that portion limed, produced a crop whose average will little if any exceed from 8 to 10 bushels per acre. A more striking instance of the benefits resulting from the application of lime I have never seen. Can the most sceptical desire a stronger proof, or its advocates a more gratifying result? Other results will subsequently be reported. In the mean time, I remain your humble and obedient servant,

A. NICOL.

GROWTH OF PLANTS WITHOUT MOULD.

From Webster's Appendix to Liebig's Organic Chemistry.

"Some account of a suspended plant of *Ficus Australis*, which was grown for eight months without earth in the stove of the Botanic Garden at Edinburgh. By Mr. William Macnab, Superintendent of the garden." (From the 3d volume of the Edinburgh Philosophical Journal, p. 77. Slightly abridged.)

"*Ficus Australis* is a native of New South Wales, and was introduced into the British gardens in 1789, by the Right Honorable Sir Joseph Banks. The plant is not uncommon now in collections in this country, where it has been usually treated as a greenhouse plant; and in a good greenhouse it thrives tolerably well, although it seems rather more impatient of cold than many of the plants from the same country.

"When I came to superintend this garden in 1810, I found a specimen of it among the greenhouse plants, where it remained for some time afterwards; but owing to the bad construction of the greenhouse here, and the very hardy way in which I was obliged to treat the plants in that department, I did not find the *ficus* thrive so well as I had been accustomed to see it do. I concluded that it required more heat, and in the spring of 1811 I placed it in the stove, when it soon began to grow as vigorously as I had ever seen it do.

"The stem of the plant was about a foot in height before any branches set out; on one of the branches, above two feet from the junction with the stem, a root was put out. As soon as this had grown about a foot long, I placed a pot under it. As soon as I found this pot filled with roots, I determined to try whether if supplied plentifully with water it would support the whole plant.

"In August, 1816, I left off watering the original large pot, and supplied the smaller one very freely with water; I kept it in this state for about eight months, till the earth in the large pot was so completely dry, that I was satisfied the plant could receive no nourishment from it. The shrub

continued quite as healthy and vigorous as when supplied with water at the original root. In the spring of 1817, I took off the large pot in which the original roots were, and exposed the roots to the full rays of the sun, by gradually shaking off the dry earth from among them ; this had no ill effect on the plant, as it still remained perfectly healthy ; it, however, had the effect of making roots be put out freely all over the plant, much more so than had hitherto been the case.

"In the latter end of the summer of 1817, I placed a root in a third pot, which was put out from a branch about three feet from the junction with the stem, and on the opposite side of the plant from that which had supported it for some time past. As soon as I found this pot filled with fibres, I supplied it freely with water, and kept the other small pot dry, as I had done before with the original root. I found the plant still continue equally vigorous as before. In the spring of 1818, I took away the second pot, which I had for some time kept dry, and exposed the roots gradually, as I had formerly done with those in the original pot.

"The third pot, which now alone supported the plant, was four feet from the lower end of the stem, and very near to the extremity of the branch, the original roots, and the second set of roots, both hanging loose in the air. The plant, however, remained in this state for nearly a year in perfect health. In May, 1819, I took a very small pot, about two inches in diameter, and filled it with earth as I had done the others, and set it on the surface of the earth in the third pot which now supported the plant. Into this small pot I introduced a root which came from the same branch, a little below the one which was in the larger (third) pot. As soon as the small pot was filled with roots, I supplied it freely with water, and gave the larger pot none but what might happen to run through the small one. After remaining in this state for near two months, I cut the branch off between the two pots ; I still supplied the small pot only with water, but occasionally at this time threw a little water over the whole plant. It continued to look as well as it had done before.

"In July last, 1819, I examined the small pot (the fourth used) and found it completely filled with roots, very little earth remaining in the pot. By this time the plant appeared to me to be very tenacious of life, and I determined to try whether it would live wholly *without earth*. I accordingly took the small (fourth) pot off, and gradually worked off what little earth remained among the roots. I at this time, however, threw plenty of water over the leaves, generally twice in the day: this was done about the latter end of July, when the weather was very warm, but it seemed to have no bad effects on the *Ficus*.

"What may appear rather remarkable is, that though this *Ficus* is a plant by no means free in producing fruit in the usual way of cultivating it, this specimen, quite suspended without a particle of earth, was loaded with figs during the months of September, October, and part of November. Two fruit were produced at the axilla of almost every leaf, and these were quite as large as I had ever seen on the plant in the hot houses of Kew Garden. The plant is beginning to grow or extend, although it has now been suspended for eight months without a particle of earth, and during that time we have had very hot weather, and also very cold weather. Roots have been put out very freely all over the stem and branches during that time. The plant now (February, 1819,) measures 7½ feet between the extremity of the root and the top of the branches, and the stem at the thickest part is 5½ inches in circumference."

EXPERIMENTS AND OBSERVATIONS ON THE ACTION OF CHARCOAL FROM WOOD ON VEGETATION. BY EDWARD LUCAS.

From the same.

"In a division of a low hothouse in the botanical garden at Munich, a bed was set apart for young tropical plants, but instead of being filled with tan, as is usually the case, it was filled with the powder of charcoal, (a material which could be easily procured,) the large pieces of charcoal having been previously separated by means of a sieve. The heat was conducted by means of a tube of white iron into a hollow space in this bed and distributed a gentle warmth, sufficient to have caused tan to enter into a state of fermentation. The plants placed in this bed of charcoal quickly vegetated, and acquired a healthy appearance. Now, as always is the case in such beds, the roots of many of the plants penetrated through the holes in the bottom of the pots, and then spread themselves out ; but these plants evidently surpassed in vigor and general luxuriance, plants grown in the common way, for example, in tan. Several of them, of which I shall only specify the beautiful *Thunbergia alata*, and the genus *Peireskia*, throve quite astonishingly ; the blossoms of the former were so rich, that all who saw it affirmed they had never before seen such a specimen. It produced, also, a number of seeds without any artificial aid, while in most cases it is necessary to apply the pollen by the hand. The *Peireskiæ* grew so vigorously, that the *P. aculeata* produced shoots several ells in length, and the *P. grandifolia* acquired leaves of a foot in length. These facts, as well as the quick germination of the seeds which had been scattered spontaneously, and the abundant appearance of young *Filices*, naturally attracted my attention, and I was gradually led to a series of experiments, the results of which may not be uninteresting; for, besides being of practical use in the cultivation of most plants, they demonstrate also several facts of importance to physiology. "The first experiment which naturally suggested itself, was to mix a certain proportion of charcoal with the earth in which different plants grew, and to increase its quantity according as the advantage of the method was perceived. An addition of ⅔ of charcoal, for example, to vegetable mould, appeared to answer excellently for the *Gesneria*, and *Gloxynia*, and also for the tropical *Aroideæ* with tuberous roots. The two first soon excited the attention of connoisseurs, by the great beauty of all their parts and their general appearance. They surpassed very quickly those cultivated in the common way, both in the thickness of their stems and dark color of their leaves ; their blossoms were beautiful, and their vegetation lasted

much longer than usual, so much so, that in the middle of last November, when other plants of the same kinds were dead, these were quite fresh and partly in bloom. *Aroideæ* took root very rapidly, and their leaves surpassed much in size the leaves of those not so treated: the species, which are reared as ornamental plants on account of the beautiful coloring of their leaves, (I mean such as the *Caladium bicolor*, *Pictum*, *Pœcile*, &c.,) were particularly remarked for the liveliness of their tints; and it happened here, also, that the period of their vegetation was unusually long. A cactus planted in a mixture of equal parts of charcoal and earth throve progressively, and attained double its former size in the space of a few weeks. The use of the charcoal was very advantageous with several of the *Bromeliaceæ*, and *Liliaceæ*, with the *Citrus* and *Begonia* also, and even with the *Palmæ*. The same advantage was found in the case of almost all those plants for which sand is used, in order to keep the earth porous, when charcoal was mixed with the soil instead of sand; the vegetation was always rendered stronger and more vigorous.

"At the same time that these experiments were performed with mixtures of charcoal with different soils, the charcoal was also used free from any addition, and in this case the best results were obtained. Cuts of plants from different genera took root in it well and quickly; I mention here only the *Euphorbia fastuosa* and *fulgens* which took root in ten days, *Pandanus utilis* in three months, *P. amaryllifolius*, *Chamædorea elatior* in four weeks, *Piper nigrum*, *Begonia*, *Ficus*, *Cecropia*, *Chiococca*, *Buddleja Hakea*, *Phyllanthus*, *Capparis*, *Laurus*, *Stifftia Jacquinia*, *Mimosa*, *Cactus*, in from eight to ten days, and several others amounting to forty species, including *Ilex*, and many others. Leaves, and pieces of leaves, and even *pedunculi*, or petioles, took root and in part budded in pure charcoal. Amongst others we may mention the *foliola* of several of the *Cycadeæ* as having taken root, as also did part of the leaves of the *Begonia Telsairiæ*, and *Jacaranda Brasiliensis;* leaves of the *Euphorbia fastuosa*, *Oxalis Barrilieri*, *Ficus*, *Cyclamen*, *Polyanthes*, *Mesembrianthemum;* also, the delicate leaves of the *Lophospermum* and *Martynia*, pieces of a leaf of the *Agave Americana;* tufts of *Pinus*, &c.; and all without the aid of a previously formed bud.*

"Pure charcoal acts excellently as a means of curing unhealthy plants. A *Dorianthes excelsa*, for example, which had been drooping for three years, was rendered completely healthy in a very short time by this means. An orange tree which had the very common disease in which the leaves become yellow, acquired within four weeks its healthy green color, when the upper surface of the earth was removed from the pot in which it was contained, and a ring of charcoal of an inch in thickness strewed in its place around the periphery of the pot. The same was the case with the *Gardenia*.

"I should be led too far were I to state all the results of the experiments which I have made with charcoal. The object of this paper is merely to show the general effect exercised by this substance on vegetation, but the reader who takes particular interest in the subject, will find more extensive observations in the "*Allgemeine deutsche Gartenzeitung*" of Otto and Dietrich, in Berlin.*

"The charcoal employed in these experiments was the dust-like powder of charcoal from firs and pines, such as is used in the forges of blacksmiths, and may be easily procured in any quantity. It was found to have most effect when allowed to lie during the winter exposed to the action of the air. In order to ascertain the effects of different kinds of charcoal, experiments were also made upon that obtained from the hard woods and peat, and also upon animal charcoal, although I foresaw the probability that none of them would answer so well as that of pine-wood, both on account of its porosity and the ease with which it is decomposed.

"It is superfluous to remark, that in treating plants in the manner here described, they must be plentifully supplied with water, since the air having such free access penetrates and dries the roots, so that unless this precaution is taken, the failure of all such experiments is unavoidable.

"The action of charcoal consists primarily in its preserving the parts of the plants with which it is in contact; whether they be roots, branches, leaves, or pieces of leaves, unchanged in their vital power for a long space of time, so that the plant obtains time to develope the organs which are necessary for its further support and propagation. There can scarcely be a doubt also that the charcoal undergoes decomposition; for after being used five or six years it becomes a coaly earth; and if this is the case, it must yield carbon, or carbonic oxide, abundantly to the plants growing in it, and thus afford the principal substance necessary for the nutrition of vegetables. In what other manner indeed can we explain the deep green color and great luxuriance of the leaves and every part of the plants, which can be obtained in no other kind of soil, according to the opinion of men well qualified to judge? It exercises likewise a favorable influence by decomposing and absorbing the matters absorbed [query, excreted] by the roots, so as to keep the soil free from the putrefying substances which are often the cause of the death of the *spongiolæ*. Its porosity as well as the power which it possesses, of absorbing water with rapidity, and after its saturation, of allowing all other water to sink through it, are causes also of its favorable effects. These experiments show what a close affinity the component parts of charcoal have to all plants, for every experiment was crowned with success, although plants belonging to a great many different families were subjected to trial." *Buchner's Repertorium*, ii Reihe, xix Bd. S. 38.)

[The foregoing article is part of Professor Webster's Appendix to his late edition of Liebig's "Organic Chemistry." The results stated show

* The cuttings of several of these plants being full of moisture, require to be partially dried before they are placed in the soil, and are with difficulty made to strike root in the usual method. The charcoal is probably useful from its absorbing and antiseptic power. The *Hakea* is extremely difficult to propagate from cuttings. All the *Laurus* tribe are obstinate, some of them have not rooted under three years from the time of planting.—W.

* See an account of these experiments in Loudon's *Gardener's Magazine*, for March, 1841.

clearly that carbon must be furnished to plants, (in carbonic acid,) and in large proportion through the roots, as well as through the leaves of plants; and, as clearly, that Liebig is wrong in supposing the former mode of supply to be so very small, and furnished almost entirely in the early growth, or before the leaves are developed, and enabled to draw the supply of carbon from the atmosphere. —Ed. F. R.]

THE BEE-MOTH.

From the Farmers' Cabinet.

Mr. Editor,—It would appear that "Bee-breeding" is to share a large portion of the attention of the community the next year. It is a deserving object, and might be made both profitable and agreeable, in proper situations and under careful management; but neither will that or any other pursuit succeed, unless it be well attended to and made a regular business. Already there are numerous contrivances to stop the ravages of the bee-moth, but to me, in this, as in most other cases, it seems by far better to *prevent* the evil by keeping the bees strong and healthy; and it is only a part of the system which I have laid down for myself, to consider the moth the *effect*, rather than the *cause* of the destruction complained of. I believe that the moth has no desire to deposite its eggs in a hive, until it knows by instinct that the swarm is unhealthy; by the putridity which is then engendered, it is taught that its services will soon be required, according to that beautiful theory so well set forth by Agricola, "wherever animal or vegetable substances are in the progress of decay, mouths are found ever ready to convert dead matter into food for living things."

And this is no new idea; I knew, many years ago, a person who kept from 20 to 30 hives of bees with uniform success, but he was peculiarly attentive to the moths, and when he saw them flitting around the entrance of any particular hive, he knew that the bees were sickly, and he would immediately remove them to a clean hive, by turning the box which contained them, placing upon it an empty hive; and by giving the lower box a few gentle blows, the bees would ascend and take possession: this was done in the evening, after the bees had returned from their labors, and the next day they would be found busily employed on their new premises, without any fear of the moth. Now it is all very pretty—these ingenious contrivances to deceive the moths by furnishing them with large and convenient entrances to sham boxes, brushed over with honey or wax, while the bees are restricted to one small and inconvenient hole of entrance—but I do not consider that nature is so imperfect as to be so easily bamboozled; I believe the moths know full as well as the man, when they are *inside* the hive, and that they will not be induced to deposite their eggs in an out-house where there is no food for their young when they come into existence. I beg therefore to repeat, I consider the moth the *effect* and not the *cause* of the mischief; the sickness of the bees and the putridity of the internal atmosphere of the hive being the true cause teaching them that the labors of their progeny will soon be required to act the part of the turkey-buzzard. Remove the cause, therefore, and the effect will cease—depending upon it, that "when the constitution is in a healthy state, there is little liability to infection of any kind."

Let, then, all those who enter the race of bee-breeding be attentive to this, and by shifting the swarms to other boxes so soon as they perceive them attacked by the moth, they will, I am persuaded, find that prevention is much easier than cure. With me, there is no doubt, the *cause of sickness* often arises from the system of withdrawing the honey by means of boxes and glasses placed on the top of the hive reducing the bees to the necessity of ever breeding in the same cells, by which they become filthy and putrid; I therefore much prefer to add another box below, on removing one from above, according to the plan proposed in that interesting little work, "Bee-breeding in the West," which is quite a *manual of the art*. In Weeks' late work on the same subject, the evil here pointed out is admitted to its full extent, but, strange to say, it is proposed to be remedied only by transferring the bees to another hive; it is said, "when bees have occupied one tenement for several years, the comb becomes thick and filthy by being filled up with the old bread and cocoons made by young bees when transformed from a larva to the perfect fly; and are so contracted that the bees come forth but mere dwarfs, and cease to swarm;" and yet, by the use of the Vermont hive, they are compelled to breed in the same cells continually. It would appear, therefore, that these patent palaces are constructed on false principles. Vir.

"AGRICULTURAL STATISTICS" CORRECTED.

For the Farmer's Register.

An article with the caption "*Agricultural statistics furnished in connexion with the late census of the United States.*" having been published over the signature of X. in the July number of the Farmers' Register, which is calculated to make false impressions, relative to the statistical information obtained in connexion with the late enumeration of the people of the United States, it is deemed proper to reply and inform the public, through the same medium chosen by X., that the extracts from the agricultural statistics, which were sent to the senate on the 24th February last, by the secretary of state, were intended as mere samples of the unexamined and uncorrected returns of the marshals, and are published as such only. See Senate Document 219. Those returns, owing, it is presumed, to the short time allowed the marshals to make up their aggregates, have been found to abound with errors, all of which are undergoing the process of examination and correction at this time, in the proper department of the government.

In the attempt to mislead the public, X. has either himself made an egregious blunder, or falsified a public document. It will be perceived by referring to his article, page 437 July number, Farmers' Register, in the paragraph relative to tobacco, he there states that Tennessee produce

26,542,448 pounds, and Virginia only 14,157,-841 pounds, or about 11,000 hogsheads of tobacco. Turn to the senate document, page 10, and you will find the number of pounds of tobacco returned from Virginia 74,157,841 pounds according to the marshals' returns; but an error of upwards of 3,000,000 lbs. omitted has been detected, which have to be added to the marshals' numbers.

Having made an error to the extent of 60,000,-000, X. then proceeds to base his calculations upon the remaining 14,000,000. The fact is the 58,000 hogsheads inspected in Virginia in 1840 corresponds with sufficient accuracy, to the 77,-000,000 pounds returned by the assistant marshals. The corrected returns show 77,187,845 lbs. which on an average of 1300 lbs. to the hogshead are exclusive of York county from which no returns had been received, equal to 59,375 hhds. 345 lbs. In the senate document no additions were made because of the inability at that time to include North Carolina, Kentucky, Michigan, and the Territories.

X. has attempted to show his skill in figures and as a statistical writer, and very properly commences with simple addition. He takes the column of "pounds of tobacco gathered" and gives as the sum total of his labors, 78,070,803 pounds. Be pleased, Mr. Editor, to run over the addition yourself, and see whether our addition or that of X. be correct, We assert that the total should be 138,070,806 pounds, and as we differ 60,000,000, it may be worth your while to see who is right. We enclose you a copy of the document for the purpose.

If after this specimen of the fitness of X. to make statistical calculations for the public eye, he be still desirous of enlightening his countrymen upon the subject of tobacco, we will inform him, that in addition to the 138,070,806 pounds reported in Sen. Doc. 219, Kentucky has returned 53,-998,090 lbs. Michigan 1,602 pounds and North Carolina 16,773,359 pounds. In the returns from Virginia an error has been detected of 3,030,004 pounds, which amount is to be placed to the credit of Virginia, making a total of 211,873,861 pounds of tobacco returned by the assistant marshals.

Notwithstanding that in the Senate Document, a note was appended, see pages 11 and 12, to the effect, that, "some of the marshals have returned pounds of ginned cotton, others in the seed, and that in the printed document the discrimination will be made," X. has thought proper to assume that the 10,767,451 lbs. of cotton are equal to 30,000 bales, or more than double her (Virginia's) actual product.

As soon as it was ascertained at the department of state that the marshals had returned cotton differently, some as ginned cotton, and others in the seed, a circular was addressed to the respective marshals in the cotton growing states, calling for information upon the subject. The result has been, that the cotton returned from Virginia in the seed, upon being reduced to ginned cotton is equivalent to 3,504,795 lbs. and from North Carolina to 14,841,783 lbs. the sum of which divided by 400 for each bale will give 45,866 bales the product of Virginia and North Carolina. It is unnecessary to follow the gentleman through the remainder of his cotton statistics, as they will only prove to be bags of wind instead of bales of cotton, he having estimated 400 lbs. of seed cotton, equally with ginned cotton to the bale—a thing unheard of before.

Upon examining the returns of Pennsylvania and comparing the marshal's with the assistant schedules, it was discovered that the marshal had set down by mistake the quantity of sugar in the adjoining column of cocoons. This has been corrected and the quantity of silk cocoons reported by the assistants is found to be 7262½ lbs. for east and west Pennsylvania. The astonishment of X. is expressed, at what he deems the incredible amount of hay produced, aggregate 9,641,225 tons. He asks is this probable? or possible? The truth is, 10 millions is far below the amount produced in the United States. If the amount did not exceed 10 millions of tons how should we be able to feed our 40 millions of domestic animals, horses, neat cattle and sheep? The 4 millions of horses consume more than half the amount, and we can inform X. if he be not aware of the fact, that a different winter provision is made for the cattle of the states he has quoted, than is provided in the pine lands of Eastern Virginia or North Carolina.

It is a matter of sufficient notoriety that besides supporting their own animals through their long winters, large quantities of pressed hay are shipped annually from the eastern states to the southern ports. The wonder of this *extraordinary* commentator upon what he deems an extraordinary document is greatly increased upon finding sugar reported among the products of New York, and he comes to the sage conclusion that they are pounds of sugar "on paper." Is this writer on the statistics of his country to be informed, and learn for the first time, that such a tree as the sugar maple exists, and that vast supplies of sugar are obtained from that source in the mountain regions of his own state? Well, sir, we can tell him that Viginia produced in 1839, according to the returns of the marshals, 1,530,541 lbs. of maple sugar, an amount which may be almost indefinitely increased if Virginia chooses to put forth her energies. If New York should have availed herself of that gift of Providence to the extent of 10 millions, it is only a reproach to our people, that they have not been equally industrious, possessing the same means and facilities.

When the extracts from the agricultural statistics were sent to the senate, a note explained at the foot of the tabular statement, why North Carolina was not included; see note, page 8, "the aggregate not yet made." In other words the marshal had not summed up the total of the counties in his district, and time was not allowed to do it in the department. This affords grounds for a sneer that, "Louisiana is the only state in the table which produces any considerable quantity of pitch, tar, turpentine and rosin, say 12,233 barrels. We presume," says X., "they are produced from some other tree than the pine;" and with this fact (the omission of North Carolina) before his eyes, he ventures to give the "Total of the United States, 31,689 barrels."

Do twenty-three states constitute the union, Mr. X.? And if so, when did North Carolina cease to be one of the number? The fact is, upon summing up the returns of North Carolina, we find reported 593,451 barrels of tar, pitch, turpentine and rosin. Nearly twenty times the amount assumed by X., for his total of the United States.

X. having thus noticed what he is pleased to term our "most egregious errors," he is pleased

to close his remarks with a summary of the other principal products, and "leaves the reader to judge of their accuracy," with the observation, that "some of them are not over-estimated." We have followed this writer so far, exposing his blunders and proving his ignorance, with all due patience; but the last of his remarks, with its affectation of knowledge, we confess is unbearable. How does X. know, or how is it possible for him to know, whether the returns of the assistants to the marshals be over-estimated? The fact is, there is no estimation about it. The numbers were obtained from the heads of families throughout the union, in answer to the interrogatories put by the assistant marshals, and are only so far erroneous, as they may have misstated ignorantly, or falsified their business, in answer to the questions so put.

It was a novel attempt in this country to obtain statistical information on an extended scale, and it is with deep regret we are compelled to say, that but for the opposition of evil-disposed men, who controlled a portion of the public press at the time, the work would have been much more perfect. There can be little doubt, from the tone of X., that he was one of those who himself set an example of contumacy, and advised others not to submit to the perquisition of the government of the United States, who bade the laws defiance, and, of course, he has the best right to find fault, if they were not executed to please him.

In giving an opinion of the statistics as obtained under the 13th section of the act of 1839, it will not be pretended that the work is perfect; but we will say, that notwithstanding the errors of omission, from individuals refusing to answer, and the misconceptions which have sometimes taken place, that when the work is published at large, it will excite surprise and attention, both at home and abroad, and upon the whole present a gratifying result. W.

[To save time, we have submitted the foregoing letter of correction to our correspondent, X., and present his rejoinder in connexion, as it will appear below.—Ed. F. R.]

REJOINDER.

For the Farmers' Register.

X. denies that he intended *to make* false impressions. On the contrary, his object was *to prevent their being made*, by the statement which took the rounds of the newspapers, as emanating from an official source, and which is now admitted by W. to be crude, imperfect and erroneous, "a mere sample," and a very bad one, which ought not to have been published. The public prints, adopting without reflection the false premises of the statement, have made comments which are calculated to mislead; and even that erudite work, "the North American Review," has adopted, as correct, the Louisiana return of 249 millions pounds of sugar, which is about treble the quantity produced in the most favorable year, and more than quadruple the average annual product. The reviewer may well say "it will excite universal surprise." W. passes over this error without remark, and fixes on the 10 millions maple sugar in the New York return, to found his charge of ignorance against X., who still believes this to be an exaggeration. Those who are acquainted with the process of making maple sugar, who know the period of time during which the sap can be obtained, and the quantity which a hand can collect and boil down, may calculate the number of persons it requires to produce 10 millions of pounds.

X. was actuated by no illiberal or improper motives in making his strictures, and he not only furnished to the marshal a correct return, but endeavored to have them furnished by others. He had never seen the Senate Document, and did not know of its publication. He based his remarks on the tables which were exclusively published in the newspapers, *additions and all.* He did not falsify them, and the blunders are not of his making. This item of tobacco is precisely as he stated it and the addition of 78,070,806 *as printed in the tables is correct.* The line for Virginia is 14,157,841 and he is not responsible for the error in it of 60 millions, as there was nothing to indicate such error when the *items* and the *sum total* corresponded. W. admits that an error of 3 millions has since been discovered. The omissions of returns from several states was specially noticed by X., particularly in regard to the tobacco and hemp of Kentucky, and the naval stores of North Carolina. So that here was no intention to mislead; and as to the product of naval stores in Louisiana, W. does not and probably cannot assert that it is correct, and he is silent on the subject of hemp and flax, conscious no doubt of the magnitude of the errors, 843,000 tons exclusive of Kentucky! More glaring than even the 281 millions pounds of sugar. The produce of the whole globe is estimated at 18,080,000 cwt.

It is admitted by W. that there was an error in the returns of silk cocoons in Pennsylvania, instead of 238,939 pounds it is 7262! Who falsified the document in this item? X. did not charge falsification, but error.

The indiscriminate returns of ginned and seed cotton were mentioned by X., and the inutility of such returns pointed out by showing to what erroneous deductions they might lead. As the marshals returns "were found to abound in errors," the publication of them without correction is the less justifiable; but the present incumbents are not responsible for the blunders of their predecessors, and instead of undertaking to defend, they would have acted more wisely to have cautioned the public against them, with a promise to correct them.

X. is charged with "ignorance and blunders," and asked "how it is possible he should know whether the returns of the assistant marshals be over estimated." He replies by referring to the returns of hemp and flax, sugar and silk, the over-estimates of which are too obvious to be mistaken.

Thus it appears that the errors as exhibited to the public were not of X.'s making, and if his remarks have caused more attention to be paid towards rendering the tables accurate, he does not regret having made them, and he can bear the sneers of W. without mortification.

P. S. The July number of Farmers' Magazine, published in London, contains the "Agricultural statistics of the United States compiled from the

returns of the marshals" and the product of tobacco in Virginia is there put down at 14,157,841 pounds. How came the London editor to falsify the document? The extravagant returns of hemp, sugar, silk, &c. are thus already circulated in Europe. Does W. need stronger proof of the impropriety of the crude and incorrect publication of the "mere samples," and is it not calculated to mislead, as charged by X?

THE TARE CULTURE.

From the Farmers' Cabinet.

At a late meeting of the Philadelphia Agricultural Society, a member inquired if any one present could speak experimentally on the culture and value of the tare or vetch, which is in such very general use in England, where the summer-soiling system is adopted; remarking, that from all accounts the plant must be astonishingly productive as well as nutritions. Having myself employed it for that purpose very largely, and for many years, I would say, its productiveness has never yet been overstated, or its value overrated, as food for all kinds of cattle. Horses, milk cows, fatting beasts, sheep and hogs, will grow fat while feeding on it, and the older it grows the more valuable it becomes, as the seed when formed in the pod, is far superior to oats or any other grain for the purpose of cattle feed; the seeds are black, and the size of very small peas. The crop is used for soiling, by cutting while green and taking it to the stables; it is sometimes fed off by sheep, confining them on it by means of temporary fencing or hurdles; cattle are not liable to become hoven while feeding it in any stage of its growth; on good land it has been known to reach the height of three feet and even more, producing as much as 12 tons of green food per acre, which, when well dried, will yield 3 tons of the most valuable hay on the farm. The first sowing takes place as soon after harvest as possible in England, upon land designed for the wheat-crop the next autumn, with the *winter* variety of seed, which can easily be distinguished from the *summer* tare, as it is smaller, rounder, and blacker; these will bear the severity of the winter; rye is often mixed, to enable the crop to stand up, when it attains a considerable height, but a sprinkling of wheat has been found best for this purpose, as it remains longer succulent in the summer. The crop from this sowing will be fit for cutting for soiling in May, and the stalks, if left in the ground, will afford a second growth for sheep feed; but as the tare is a fallow crop it is the best management to cut all off and plough the land deep as soon as the crop is removed, well working and cleaning it during the summer, preparatotry to wheat-sowing early in the autumn, after a dressing of well-prepared compost, if this has not been given to the tares—a far better arrangement for both crops. The next sowing is with the *summer* variety of the tare, as early in March as the season will admit, on land that has been ploughed preparatory in the autumn or winter; again in April another crop is sown, and if necessary, two other sowings might take place, the last so late as the end of June, that so a succession of this most valuable crop might be secured for the whole of the summer, and until the end of September.

Such crops produce immense quantities of manure, which is carried from the sheds and *composted* for dressing others; turnips, for instance, which may be sown on the land from which the first crop of tares has been carried, and fed off in time for wheat-sowing in the autumn. It must not be forgotten, that the richer the land, the greater will be the crop of tares, and none will pay so amply for manure; but when the crop is very heavy, there is less chance of obtaining good seed, and if that be the object, it is recommended to mow the first crop early for soiling, and permit the second growth to stand for seed, which is sometimes a precarious business, nothing being more uncertain; I have purchased seed at a guinea and a half a bushel, and sold the next year's produce, obtained from it, at six shillings a bushel! When the price of seed is moderate, the quantity sown is two bushels or two and a half per acre, but whatever the price may be, it will be repaid in the crop, if the land be in good heart. As much as 30 bushels of seed per acre has been obtained, but 15 bushels, and often half that, is more common. Under a heavy crop of tares, the land will be found perfectly clean and mellow, and will turn up like an ash-heap: and there is no question with me, that the crop may be raised with success in this country, if well cultivated on good land, rather stiff in its nature, and lying cool.

With regard to the value of the tare for soiling, it has been calculated that ten times the stock might be kept on them than on any other commonly cultivated crop; horses require no corn or any other food, and cows give more butter while feeding on them than on any other food whatever. Is it not strange, that no regular experiment on an extensive scale has yet been made on such an invaluable crop in this country? D.

HENRICO AGRICULTURAL AND HORTICULTURAL SOCIETY.

From the Richmond Whig.

The next exhibition of this society will commence on the 20th day of October next, with stock, agricultural implements, &c., and be continued from day to day until completed.

The farmers of the state, and all others who take an interest in the cause, are respectfully invited to attend. The arrangements of the society, with its advantageous location, justify us in expressing our confidence, that the exhibition and fair will amply repay a trip to Richmond from any part of the state.

The following premiums will be awarded:

No. 1. For the best stallion, for harness, the saddle, or draught (the premium not having been awarded at the spring exhibition) $15 00

Committee—Gen'l. Bernard Peyton, Richard B. Haxall and Charles Marx.

No. 2. For the most highly improved and best cultivated farm, a premium of $25.

For the second best $20.

For the third best $15.

For the fourth best $10.

Reference being had to the means (as well

pecuniary as others) of the proprietor for improvement; the amount of labor employed upon it; the means resulting from the vicinity of the farm to the city, &c. The object being to place the industrious cultivator, with limited resources, and no other labor than his own, upon the same footing as the largest cultivator with ample resources. It is to be distinctly understood, that not only the actual fertility of the soil will be considered, but special attention shall be paid to the means which are in actual operation for enriching the farms; to the condition of the enclosures; to the mode of cultivation, whether conducted with neatness, system and economy; to the condition of the stock, and, especially, whether provision has been made for their comfortable accommodation in bad weather. The buildings also, farming utensils, garden, and every thing connected with the comfort and prosperity of the establishment will come under review of this committee.

Committee—Wm. H. Richardson, Richard G. Haden and Francis Staples.

No. 2. For the best garden, not less than two acres $15.

For the second best $10.

Committee—John Carter, Richard Hill, jr. and Joseph Sinton.

No. 4. For the best field of corn, not less than five acres $15.

For the second best $12.

For the third best $10.

For the fourth best $8.

Committee—Major Ed. Christian, Edwid Hill and Wm. A. Gay.

No. 5. For the best field of tobacco, not less than one acre $10.

Committee—John C. Hobson, Frederick Bransford and Wm. Anderson, Jr.

No. 6. For the best crop of turnips, not less than half an acre $8.

For the second do. $6.

For the third do. $4.

No. 7. For the best crop of beets, carrots or parsnips, not less than half an acre $8.

For the second best $6.

For the third best $4.

No. 8. for the best crop of potatoes, Irish or sweet, not less than half an acre $6.

For the second best $5.

No. 9. For the best crop of cabbages, not less than half an acre $6.

For the second best $4.

No. 10. For the best crop of pumpkins, not less than one acre $6.

For the second best $4.

Committee—Ro. Carter Page, Wm. Miller and I. A. Goddin.

Persons who intend to compete for any of the foregoing premiums, except No. 1, will please give notice to the committees appointed to award the premium or premiums for which they will be competitors, by the 15th of September next—after which it will not be practicable to attend to any application.

The foregoing premiums will be awarded on the first day of the meeting, immediately after the annual report of the society, when the several committees are required to hand in their respective reports to the president. The exhibition of stock and agricultural implements will then be made; after which a fair will be held for the sale of such stock and other articles as may be offered; and it will be continued on the second day, if not concluded on the first. The succeeding portion of the exhibition will be in the city, in the largest room or rooms that can be obtained, when the following premiums will be awarded; after which, a second fair will be held for the sale of such of the articles as may be offered.

No. 1. For the neatest and most substantial counterpain, a premium of $6.

For the second best $4.

No. 2. For the neatest and most comfortable mattress, filled with hackled shucks, or cotton, and made at home $5.

For the second best, $3.

No. 3. For the best comfort or comfortable, $6.

For the second best, $4.

No. 4. For the best bed quilt, $6.

For the second best, $4.

No. 5. For the best table cloth, $6.

For the second best, $4.

No. 6. For the neatest and most substantial carpet (not less than 10 yards,) $10.

For the second best, $5.

No. 7. For the best hearth rug, $6.

For the second best, $4.

No. 8. For the best specimen of stockings, socks, gloves, or mittens, of Virginia raised silk, thread, wool or cotton, worsted or mixed, $7.

For the second best, $6.

For the third best, $5.

For the fourth best, $4.

No. 9. For the best specimen of fruits—apples, pears, &c., $10.

For the second best, $5.

No. 10. For the best specimen of dried fruits, not less than half a bushel, $5.

For the second best, $3.

No. 11. For the best specimen of preserves, not less than one gallon, $5.

No. 12. For the best specimen of pickles, not less than one gallon, $5.

No. 13. For the best specimen of flowers, the production of the exhibitor, $10.

For the second best, $5.

Premiums will be given in money or plate, at the discretion of successful competitors.

The society hopes to have the aid of the ladies, to award the thirteen last mentioned premiums.

The committee have thought it expedient to make the premiums large in number, rather than in the amount, to afford the gratification of a premium to as many as possible.

It is to be understood, that all the articles on which the thirteen last premiums are offered, must be the production of the exhibitor.

The mechanics and artisans of the city, and others to whom it may be convenient, are respectfully invited to send to the first day's exhibition, such specimens of their own industry and skill, as they may think proper to have exhibited.

The most ample and particular arrangements will be made for the accommodation of stock, for any number of days that may be necessary, and it is recommended that it be generally on the ground by the evening preceding the first day's exhibition.

The following additional committees are appointed, viz:

To select a place for, and to conduct the first

day's exhibition, the president of the society, Charles T. Botts and Richard Hill, Jr.

To select a place for, and to conduct the succeeding portion of the exhibition, Wm. B. Chittenden, Gustavus A. Myers, Dr. Henry Myers, Thomas A. Rust, Wm. McCrery, and Henry Ludlam.

JESSE H. TURNER,
THOMAS S. DICKEN,
RICH. G. HADEN,
WM. H. RICHARDSON,
JOSEPH RENNIE,
WM. D. WREN,
Executive Committee.

A SUGGESTION TO AGRICULTURAL SOCIETIES.

For the Farmers' Register.

To the Agricultural Societies of the U. States.

One who has long deeply felt the importance to human comfort and welfare of the great cause to which you have devoted yourselves, takes the liberty to address you in regard to the best means of promoting it by your associated efforts. If you are all actuated, as he sincerely believes you are, by the true spirit of such institutions, you will at least take in good part the suggestions which I am about to offer, whether you adopt them or not; and you will do me the justice to impute no other motive to me than an earnest desire to contribute my mite towards an object which all who truly love our country have much at heart. That object is, the improvement of American husbandry in all its branches. But I have not the vain presumption even to attempt an enumeration of any of the direct means by which this improvement could be best accomplished. Were I fully capable of making such enumeration, it would lead me too far from my present purpose, which is merely to invite your attention to the serious consideration of a plan by which it seems to me that much greater interest could be given to the meetings of all the agricultural societies throughout the United States.

This plan is, for each society occasionally to invite some member of another society to address them at their annual meetings, and, when such invitation was accepted, to give public notice thereof. Perhaps it would sometimes happen that the stranger's address might not be better than that of the individual who usually addressed them. Still the novelty of the thing would certainly attract a larger number of attendants than ordinary; for we all know, that the disease of "*itching-ears*" which prevailed so much in St. Paul's day, is very far from having ceased in our times. Nay, it would seem to be on the increase. Why else do we every where see such crowds of people collect together at any place where it has been announced that a strange preacher from a distant part of the country will hold forth? No one believes that it is either religion or a regard for public worship which draws together the greater portion of the assemblage. It is neither more nor less than *to allay the itching of their ears.* Now, I verily believe this ancient disease to be incurable, and therefore most earnestly recommend, (if you will pardon me for the liberty,) that you will endeavor to extract good out of evil. Apply to this malady the unction of good words from strange lips, and most confident do I feel that you will soon experience the beneficial effects of such treatment.

The circumstance which suggested this plan to my mind was, the recollection of the admirable addresses delivered by the late lamented Judge Buel before the Fulton County Society, the State Agricultural Society of New Jersey, the Agricultural Institute of New London and Windham counties, and the Agricultural and Horticultural Society of New Haven, by each of which he had been invited to address them. The newspapers of the day represented the concourse of people, on all these occasions, as being far greater than it had ever been before. This, beyond doubt, was caused in a great measure by the deservedly high character of that most worthy, talented, and truly patriotic citizen. But I still believe, that even if he had been an entire stranger to the great majority of the attendants, each assemblage would have been greater than at any ordinary annual meeting, when it was known that they would be adddressed only by one of their own society.

Generally speaking, the benefits of such addresses, (supposing them to be nearly or quite equal in merit,) will be in proportion to the numbers who hear them. Consequently any fair means to increase these numbers should always be adopted: and more, I think, will be found of greater efficacy than for all our societies to reciprocate such invitations as are here proposed. That they would generally be accepted I cannot doubt, any more than I can doubt that such acceptance would give much additional interest to the meetings of all our agricultural societies, and thus indirectly augment their power to do good. They might not always nor often succeed in procuring a gentleman to address them who was nearly equal to Judge Buel. Indeed, I believe it would be a hard matter, among all our societies, to find his match in all respects. But the search should certainly be continued, unless we decide beforehand that it would be fruitless. Even to be ranked second to such a man would be great praise, and enough to gratify the ambition of any one, who was not inordinately vain of his own qualifications.

Should the editors of our other agricultural papers generally approve of the plan here suggested, their republication of it will much oblige a true

FRIEND TO AMERICAN HUSBANDRY.

Aug. 17*th*, 1841.

A DISCOURSE ON THE CHARACTER, PROPERTIES, AND IMPORTANCE TO MAN, OF THE NATURAL FAMILY OF PLANTS CALLED GRAMINEÆ, OR TRUE GRASSES.

Delivered as a lecture before the class of the Chester County Cabinet of Natural Science, Feb. 19, 1841.

By William Darlington, M. D.

Gramina ubique terrarum sociatim vigent, laeta praebent pecudibus pascua et humano generi annonam. ENDLICHER, *Genera Plantarum.*

The late David Douglas—an enthusiastic votary of *Flora*, and finally a martyr in the cause—was so long engaged in exploring and collecting

the botanical treasures of our western wilds, that he became familiarly known to the red men of the forest, by the cognomen of the "*Man of Grass.*"

Although I have but slender pretensions to the significant title conferred by our aboriginal brethren, on the unfortunate Scottish botanist,—I have an idea, nevertheless, that those best acquainted with my vegetable predilections, will be prepared to expect, on this occasion, a discourse on some such humble and terrestrial objects,—rather than a Phaeton-like attempt to imitate my successful colleagues, in traversing the ethereal regions of intellect. They will doubtless conclude, that if it was sound advice to the cobbler, not to venture beyond his *last*,—the culler of *simples* should in like manner profit by the admonition, and confine himself to his plants. I have therefore selected a topic, for the evening, in accaccordance with these suggestions. Nor do I consider the change in the entertainment—unpalatable though it may be—altogether without its advantages. There is a kind of analogy between the mind and stomach, in relation to their sustenance: and, as the epicure finds it salutary, at times, to substitute bran bread for his habitual dainties,—so the mind, which has been feasting on intellectual delicacies, may peradventure be benefited by an occasional transition to coarser fare. At all events, it may enhance the gratification of a return to its wonted enjoyments.

I propose to attempt a cursory notice of the character, properties, and importance to man, of a single tribe, or family, of the vegetable creation—known to the naturalists by the name of *Gramineæ*, or the *true Grasses*: and while I calculate with some confidence, upon a fellow-feeling among the *botanical* portion of the audience,—I am not without a hope, that—in a district so distinguished for its agricultural advancement—the subject will also be found to possess a degree of *general* interest.

Before entering into particulars, however, it may be useful to make some preliminary explanations,—or, as the politicians say, to "define our position." The term *grass*, in our vernacular tongue, is frequently used in a vague sense—to designate every kind of herbage found in our meadows and pastures; hence, we often hear people speak of *clover*, *lucerne*, and other plants—which have no botanical affinity whatever with the *true grasses*—as though they really belonged to that remarkable tribe of vegetables. But such is not the language of naturalists; and ought not to be, of any well-informed person. An accurate knowledge of objects can neither be acquired, nor communicated, without precision in the use of terms. The distinctive characters of that family of plants, of which we propose to treat, are now well understood, and have been satisfactorily defined.

Whenever we meet with a plant, having a cylindrical, jointed *stem*, with the joints solid, and the intervening portions hollow—or, in a few instances, filled with a pith-like substance—the *leaves* alternate, one originating at each joint, embracing the stem with its base, and forming a sheath which is slit on one side down to its origin—and the *flowers* protected by those peculiar envelopes, known by the name of *chaff*—we may take it for granted that we have before us a *true grass*. Brief and simple as is this definition, it will be found to contain the most obvious characteristics of the tribe; sufficient, it is believed, to distinguish it from all others. While we are on the subject, however, a few additional traits may perhaps be adverted to, with propriety. The *cuticle*, or skin of the grasses (for they have no *bark*, properly so called) contains a considerable portion of *silex*, as is shown by its vitrification, when stacks or other dense masses of unthrashed grain, are burnt. A sort of glass is produced from this silex, which preserves the form of the plant, even to its minutest parts. The *nerves*, or *veins*, in the leaves of this family, are all nearly parallel, in consequence of which, those appendages (i. e. the *leaves*) are entire, generally narrow, enlongated, and more or less linear in their form. The *flowers* are mostly small, disposed in little clusters of spikelets, and these spikelets are variously arranged, in spikes, racemes, or loose panicles. Each *spikelet*,—consisting sometimes of one but more commonly of two, three, or many florets—is usually embraced, or supported at the base, by two chaffy pieces, called *glumes*; and each *floret* is immediately protected by two somewhat similar chaffy coverings, which for the sake of distinction, are denominated *paleæ*. These chaffy coverings of the flowers and seeds of the grasses, are wholly unlike the delicate and showy floral envelopes of most other plants,—and seem to be, in fact, the mere stunted vestiges of abortive leaves—or rather of their *sheaths*—closely crowded together. Hence we find them, like the leaves, constantly *alternate*: for, although approximated in pairs, they are never exactly opposite—or originating in the same plane—as we see to be the case with the sepals, and petals, of other tribes. The number of *stamens* is usually *three*—rarely *six*, or some multiple of three—and occasionally, from abortion, some intermediate, or smaller number. Each fertile flower produces a *single seed*,*—the chief bulk of which is called *albumen*, and is that nutritious portion of our cultivated grains, from which the miller prepares *flour*. The *embryo*, or living rudiment of the future plant is comparatively a mere speck, or minute point, in the seeds of the grasses,—snugly situated, on the outer side, near the base of the albumen; where it lies dormant, until the concurring causes of vegetation (namely, warmth, moisture, and oxygen,) excite it into active life. This embryo—which is, in fact, an entire plant in miniature—may be distinctly and satisfactorily observed in a grain of wheat, or Indian corn; especially at the moment of sprouting, or incipient growth,—when it will be found that the principal mass of the grain consists of the apparently inorganic matter, already mentioned by the name of albumen. It is this large, farinaceous or *mealy* portion, of the seeds of grasses, which renders the *cerealia*, or cultivated grains, so valuable to man—as furnishing the chief material for *bread*. Wherever the *albumen* of seed is found to be

* The fruit of the grasses, generally, appears to be a simple naked seed, in each fertile floret,—but the seed is, in fact, invested with a pericarp, or covering, as in most other plants. The pericarp in this family however, is thin and membranaceous,—and is usually so completely adherent to the proper coating of the seed, as to be undistinguishable from it. In some species—such as oats, barley, rice, &c.—there is found an *additional envelope*, formed of the *paleæ*, or inner chaff, which closely embraces the fruit.

mealy, it is always innocent and nutritious—even when the residue of the plant is poisonous. In some instances, it is replete with *oil*—as in the poppy tribe; and in the seeds of the coffee plant, the albumen is of a *horny* texture. There are other and large tribes, again,—such as the *leguminous* plants—including our common garden beans, peas, clover, &c.—in which the seeds are wholly destitute of the appendage called albumen; —the miniature plant completely filling the integuments of the seed, and its chief bulk consisting of two thick, fleshy lobes, called *cotyledons*. These lobes, or cotyledons, are the crude *primary leaves* of the future plant (appropriately called *protophylles*, by the French botanists,)—and doubtless serve, in some degree, as *substitutes* for albumen in supplying nutriment during the first stages of vegetation.

Having thus hastily glanced at some of the more striking features of the extensive tribe, technically denominated *grasses*—and the characters by which they are distinguished from other plants—I flatter myself we shall have no difficulty in recognizing any number of that family which may hereafter come in our way. It will be no *news*, indeed, to any of us, to be told that "red-top," "timothy," and "fox-tail," are *grasses;* and we all, perhaps, may be aware, that our cultivated oats, barley, wheat and rye—and even rice—belong to the same category: but the fact may not be equally familiar to every one, that our Indian corn, and broom corn—the sugar cane, and the bamboo—are also *true and genuine grasses*. Much as these last-mentioned plants may seem to differ from the multitude of common grasses, the disciplined eye of the botanist perceives at a glance, that they all belong to the same family: and indeed, so eminently *natural* is the whole tribe—*i. e.*, so strong is the general resemblance in the characters and habits of its members—that superficial observers, finding it so much easier to adopt, than to verify the crude notions of the vulgar, have actually supposed several species to be continually, and reciprocally, changing into each other!* It is to be hoped, however, that our ingenuous youths will yet learn to discriminate between truth and error, in the objects around them; and not be content—as a popular writer expresses it—"to wander among the productions of nature with little more perception, or enjoyment of her charms, than a cow on a common, or a goose on a green." In this hope, and under this impression it was, that I thought a rapid sketch of so important a tribe of the vegetable creation might be found in some degree interesting.

The whole number of flowering plants, already known to the botanists, has been estimated at about *forty thousand species*,—of which it is supposed the grasses constitute *one twentieth* part: but if we take into the account, the immense number of *individuals* of many species, the *proportion* of grasses to vegetation in general will be greatly increased. The known grasses of *Chester county*—native, naturalized, and cultivated—amount to about *one hundred species*, or *one-tenth* of the whole number of flowering plants, inhabiting the same district. A large portion, indeed, of this vast family, is not known to possess any properties which man has yet been able to convert to his own immediate advantage: But it becomes us to be cautious how we decide upon the value of objects, from the imperfect views of their *utility*, afforded by our limited knowledge. Many created beings, which appear to us as nuisances, may be important agents for good, in the general economy of nature. The most worthless grasses—or the veriest *weeds* that annoy the husbandman—*may* be the instruments of a wise Providence, for collecting fertilizing principles from every falling shower, or passing breeze,—and imparting them, in turn, to the soil on which they are finally decomposed. These silent and imperceptible processes may doubtless be extended, and their benefits enhanced, by human ingenuity and co-operation; but their spontaneous occurrence, in the great laboratory of nature, can scarcely elude the notice of the scientific observer.

With respect to *locality*, or peculiar places of growth, affected by this numerous tribe, there is but little to remark.* We find grasses growing on dry land, and in water; but none that are properly *marine* plants. They occur in every kind of soil; both in society with others, and alone; sometimes occupying considerable districts, to the almost entire exclusion of other forms of vegetation, and thus forming the beautiful *turf*, so much admired in lawns, and meadows. *Sand* appears to be less favorable to their growth; but even

* It is a curious circumstance, in the history of this vulgar error, that, in former times, when the occult sciences flourished, the peasantry of Europe imagined all our cultivated small grains to be subject to this kind of transmutation:—that wheat was often changed, first into rye, then into barley, from barley to ray grass, or lolium, from lolium to bromus, or cheat, and finally, from bromus to oats! They supposed, moreover, that by the agency of a fertile soil, the degenerate grass could be gradually restored to its original form; or, at least, that it could be brought back as far as rye!—"Veteres credebant frumentum per gradus degenerare in macriori terra, atque triticum in secale, secale in hordeum, hordeum in bromum, bromum in avenam et sic per gradus descendere, immo credebant etiam semina bromi vel hordei in fertiliori terra producere secale."—*Caroli a Linne, Amœnitates Academicæ, tom.* 5. Even in our own enlightened age and country, as we are wont to phrase it—there are yet many persons strongly tinctured with the notion, that wheat is frequently transmuted into *bromus*, or cheat;—though I have not met with any so full in the faith, as to believe they can bring the degenerate offspring back again to its pristine state. It is remarkable, also, that this obsolete notion—so entirely exploded among scientific naturalists—has lately found an advocate in a gentleman of some pretensions, as a geologist,—and who has, more recently, acquired considerable notoriety, by his researches concerning *territorial limits*: I mean Mr. *Featherstonehaugh*. As that gentleman has been so astute in detecting the mutability of the *laws of nature*,—we ought not, perhaps, to be surprised at his discovery of the extraordinary *mutation* in our *north-eastern boundary*, since it was established by the fathers of the republic! It is quite as likely that landmarks should change their locality, as that objects of natural history should lose the distinctive characters impressed on them by the hand of the Creator.

* A number of the facts and observations concerning the *gramineæ*, here presented, may be found in Prof. Lindley's Natural System of Botany,—a most valuable and interesting work, to the student of that science.

this produces species which seem almost peculiar to itself.

The *diffusion* of this family has almost no other limits than those of the whole vegetable kingdom. Grasses occur under the equator; and are among the few plants to be met with in the frozen regions of Spitzbergen. On the mountains of the south of Europe, and on the Andes, in our own hemisphere, they ascend almost to the line of perpetual snow.

The most striking differences between tropical and extra-tropical grasses are the following:

1. The *tropical* grasses acquire a much greater *height*, and occasionally assume the appearance of trees. Some species of *bamboo*, are from 50 to 60 feet high.

2. The *leaves* of the tropical grasses are broader, and approach more in form to those of other families of plants.

3. The *flowers*, in tropical grasses, are more frequently imperfect, or diclinous,—i. e. the stamens and pistils are oftener found in distinct and separate envelopes: they are also usually softer, more downy, and elegant,—as may be seen in the sugar cane, and others.

4. The *extra-tropical* grasses, on the other hand, far surpass the tropical in respect of the number of individuals. That compact grassy turf, which, especially in the colder parts of the temperate zones, in spring and summer, composes the green meadows and pastures, is almost entirely wanting in the torrid zone. The grasses there, do not grow crowded together,--but, like other plants, more dispersed. Even in the south of Europe, they are less gregarious,—and meadows are seldomer to be seen than in the north.

As to the distribution of *individuals*, the generality of species are social plants. The distribution of the *cultivated* grasses is determined not merely by climate,—but depends partly on the civilization, industry, and traffic of the people—and often on historical events. Within the northern polar circle, agriculture is found only in a few places. In Siberia, grain reaches at the utmost only to 60 degrees—in the eastern parts scarcely above 55—and in Kamtchatka there is no agriculture, even in the most southern parts, lat. 51 degrees. The polar limit of agriculture on the northwest coast of America, appears to be somewhat higher; for in the more southern Russian possessions (57 to 52 degrees,) barley and rye come to maturity. On the east coast of America, it is scarcely above 50 to 52 degrees. Only in Europe—namely, in Lapland—does the polar limit reach an unusually high latitude, viz: 70 degrees. Beyond this, dried fish, and here and there potatoes, supply the place of grain. The grains which extend farthest to the north in Europe, are barley and oats. These, which in the milder climates are not much used for bread, afford to the inhabitants of the northern parts of Norway and Sweden, of a part of Siberia and Scotland, their chief vegetable nourishment. Rye is the next which becomes associated with these. This is the prevailing grain in a great part of the northern temperate zone; namely, in the south of Sweden and Norway, Denmark, and in all the lands bordering on the Baltic, in the north of Germany, and part of Siberia. In the zone where rye prevails, wheat is generally to be found,—barley being here chiefly cultivated for the manufacture of beer, and oats supplying food for the horses. To these there follows a zone in Europe and western Asia, where rye disappears, and wheat almost exclusively furnishes bread. The middle, or the South of France, England, a part of Scotland, a part of Germany, Hungary, the Crimea and Caucasus, as also the lands of middle Asia, where agriculture is followed, belong to this zone. Here the vine is also found; wine supplants the use of beer, in many places; and barley is consequently less raised. Next comes a district where wheat still abounds, but no longer exclusively furnishes bread,--rice and maize becoming frequent. To this zone belong Portugal, Spain, part of France, on the Mediterranean, Italy and Greece; also the countries of the East, Persia, nothern India, Arabia, Egypt, Nubia, Barbary, and the Canary Islands: in these latter countries, however, the culture of maize or rice, towards the south, is always more considerable; and in some of them, several kinds of *Sorghum* (kindred species of our broom corn), and *poa Abyssinica* (a plant related to our meadow grass) —come to be added. In both these regions of wheat, rye only occurs at a considerable elevation; oats still more seldom, until at last they entirely disappear,—barley affording food for horses and mules. In the eastern parts of the temperate zone of the old continent, in China and Japan, our northern kinds of grain are very unfrequent,—and rice is found to predominate. The cause of this difference between the east and the west of the old continent, appears to be in the manners and peculiarities of the people. In North America, wheat and rye grow as in Europe,—maize is more reared in the western than in the old continent, and rice predominates in some of the southern districts of the United States. Within the torrid zone, maize predominates in America—rice in Asia—and both those grains in nearly equal quantity in Africa. The cause of this distribution is, without doubt, historical: for Asia is the native country of rice, and America of maize.

In some situations—especially in the neighborhood of the tropics—wheat is also met with, but always subordinate to these other kinds of grain: In the high lands of South America, there is a distribution similar to that of degrees of latitude. Maize, indeed, grows at the height of 7200 feet above the level of the sea, but only predominates between 3000 and 6000 feet of elevation. Below 3000 feet it is associated with other vegetables peculiarly tropical; while from 6000 to 9260 feet, the European grains abound,—wheat in the lower regions—and rye and barley in the higher.

To the south of the tropic of Capricorn, wherever agriculture is practised, considerable resemblance with the northern temperate zone may be observed. In the southern parts of Brazil, in Buenos Ayres, in Chile, at the Cape of Good Hope, and in the temperate zone of New Holland, wheat predominates; barley, however, and rye, make their appearance in the southernmost parts of these countries, and in Van Dieman's Land.—In New Zealand the culture of wheat is said to have been tried with success: but the inhabitants avail themselves of a species of *fern* [Acrostichum furcatum] as the main article of sustenance. Hence it appears, that, in respect of the predominating kinds of grain, the earth may be divided

into *five* grand divisions, or kingdoms: the kingdom of *rice*—of *maize*—of *wheat*—of *rye*,—and lastly of *barley and oats*. The first three are the most extensive; the maize has the greatest range of temperature; but rice may be said to support the greatest number of the human race.*

With reference to the *properties*, and *uses*, of this comparatively humble tribe of plants, it may be observed, that it probably contributes—directly and indirectly—more largely to the sustenance and comfort of the human family, than any, if not all, of the other groups of the vegetable creation. Those numerous species which are regarded as mere weeds,—which even the browsing herds neglect, and trample under foot,—may yet, as has been intimated, be operative, in gradually fertilizing the soil. Some have been found of great value, simply in fixing and keeping together the blowing sands of the sea-coast, by their creeping suckers and tough entangled *roots*. Among these, the *Arundo arenaria, L.*, and the *Cynodon dactylon, Pers.*, are the most remarkable. The roots of the latter are also employed in India, in the preparation of a popular beverage. The *culms* or stems of the grasses, have been put in requisition for various economical, and even ornamental purposes. The *arundo*, just mentioned, is extensively used in the Hebrides, for making ropes, mats, bags, &c. The branches of the panicle, at the summit of our cultivated broom corn (*Sorghum saccharatum, Pers.*) furnish a large supply—as every one knows—of those convenient implements, called besoms, and brushes. The culms of *rye* afford a good material for roofing, and are much employed, by the farmers in Lancaster and some other counties of this state, in thatching their barns. The Chinese manufacture a delicate paper from the *rice* plant; and in our own country, a course but very useful paper is made from *oat straw*—and even from the *husks* of Indian corn. In the country of the *bamboo, (Bambusa arundinacea, Willd.)* the culms of that stately grass furnish spars for the equipment of sail-boats, and walking canes for the aid of pedestrians; while some of its slender congeners afford rods, for our anglers, which honest Izaak Walton himself might have envied. Large quantities of paper, also, are made in China from the bamboo. Some of the reeds of Brazil are described as living fountains: they grow from 30 to 40 feet high, with a diameter of six inches, form impenetrable thickets, and are exceedingly grateful to hunters; for on cutting off such a reed below the joint, the stem of the younger shoots is found to be full of a cool pleasant liquid, which immediately quenches the most burning thirst. The fashionable world, moreover, is indebted to the gramineous tribe, for some favorite articles of dress. The well-known head-dresses, from *leghorn*—so highly prized by the ladies—are manufactured from the straw of a delicate variety of wheat; and in our own country, many beautiful imitations of leghorn hats and bonnets have been made from the slender culms of the grasses,—particularly the meadow, or green grass [*Poa pratensis, L.*] In the days of our grandmothers, too, this family of plants contributed to the decoration of the rustic fair: for even in those unsophisticated times, decorative appendages were not entirely eschewed. An humble substitute for necklaces of coral, and pearl, was found in the fruit of an oriental grass, often seen in the gardens, whose hard and polished involucres are known by the name of *Job's tears* [*Coix lachryma, L.*] But it is not only the means of adorning the person, that are to be derived from this source. The fistular stem, or culm of the grasses—especially of the oat-plant—appears to have furnished the shepherds of antiquity with the material for an instrument of music!—as, in *Virgil's* first pastoral, we find one of these swains reclining under the shade of a spreading beech, wooing his rustic muse, and wakening the sylvan echos, with a *slender oaten pipe*,—or, to adopt the language in which he is accosted by *Melibœus*,—

"Silvestrem *tenui* musam meditaris *avena*."

In an *agricultural* point of view, the superior value of the grasses as materials for pasture and hay, is owing to the large quantity of saccharine matter with which they abound, about the time of flowering; and which is the source of that rich, sweet odor, observable in well-preserved hay. This saccharine matter, which pervades the whole plant before flowering, and is most perfectly elaborated at that epoch, is designed to be ultimately concentrated and deposited in the seeds,—chiefly in the form of *farina*; and hence we find the *herbage* of comparatively little value after the fruit is fully matured. The skilful agriculturist, therefore, when he wishes to have good *hay*, cuts his grass at the moment when the nutritious juices are most perfect—and while they are diffused throughout the plant. But when his main object is the *seed*,—as in our cultivated grains,—he of course postpones his harvest until the career of vegetation is finished. It is needless to enlarge on the importance of the *herbage* of the grasses, in supplying the food of our domestic animals—and, indirectly, the animal portion of our own food. I will, however, mention those species which are deemed of chief value in our meadows and pastures,—naming them in what I consider the order of their excellence, 1. The meadow, or green grass, erroneously called "blue grass," in Kentucky [*Poa pratensis, L.*]—2. Timothy, or the "herd's grass," of the northern states (*Phleum pratense, L.*)—3. Orchard grass (*dactylis glomerata, L.*)—4. Meadow fescue [*Festuca pratensis, L.*]—5. Blue grass [*Poa compressa, L.*]—6. Ray grass [*Lolium perenne, L.*]—7. Herd's grass, of Pennsylvania, often called "red top,"—the "bent grass" of the English [*Agrostis vulgaris, L.*]—And, 8. Sweet-scented vernal grass [*Anthoxanthum odoratum, L.*] There are a few other grasses—native, or partially naturalized—to be found on our farms,—and which are more or less eaten by cattle, when the better ones are wanting: But they are of comparatively little value,—and good farmers are always desirous to supersede them, as soon as possible, by some of those above named. It is remarkable, that all the grasses here enumerated are believed to have been introduced into our country. They are all more or less extensively naturalized; but some of them require to be regularly sown, to insure a full crop,—and are therefore known as *artificial* grasses. Those generally cultivated, here are the timothy, and orchard grass,—and occasionally we see the ray, and herd's grass, or

* Schouw, in Lindley—ubi supra.

red top;—though these last are not so much esteemed. The others are completely naturalized; and when the soil is either originally fertile, or adequately improved, the best of them,—viz. the meadow grass, and the fescue,—soon appear spontaneously in our pastures, and supersede the artificial ones. Now and then, we hear of attempts to introduce *new* grasses to the notice of our agriculturists,—accompanied by exaggerated statements of their value;—such as the taller oat-grass (*Avena elatior, L.*)—sometimes called "grass of the Andes": and a few years since, one of our coarse indigenous grasses, called "sesame", or "gama grass" (*Tripsacum dactyloides, L.*), was so extravagantly lauded in the journals, that many lovers of novelties were induced to try the experiment of cultivating it, in place of the old approved plants; but, like some *other* "experiments" that we wot of, in our day, it resulted in a total failure.* It is, indeed, exceedingly doubtful, whether any other grasses are so well adapted to our climate, and our wants, as those old and long-tried acquaintances of our farmers, which I have already enumerated.

I have thus endeavored to give some idea of the uses to which the roots, stems and general herbage of the grasses are or may be appropriated, in the arts, and in domestic and rural economy. But it is from the *seeds* of the grass tribe—with one exception—that we derive the most eminent and immediate advantages. To them we are indebted for what has been emphatically called the staff of life. The chief bulk of those seeds being made up of *farinaceous matter*, which, as has been stated, is always innocent and nutritious—they are consequently well adapted to the sustenance of man. They not only supply us with *bread*, but with all the countless variety of dishes which ingenuity has prepared, both from the flour and the unground grain; and if but few species are commonly employed for that purpose, it is because the large size of their seeds, compared with those of other grasses, renders them more eligible as objects of culture. There is but a solitary instance alleged of the unwholesomeness of the seeds, in the entire family of the grasses, viz.: those of the darnel (*Lolium temulentum, L.*,)—a common weed in many parts of Europe—but scarcely known to the United States: and even in this case, the deleterious effects are probably much exaggerated. It is only when the seeds are damaged, or diseased, that they become injurious to health;—as when putrefaction has commenced—or when that peculiar disease and enlargement of the grain occurs, which is known by the name of *ergot*.* This kind of diseased grain (the effect, it is believed, of a parasitic fungus,) has been found to exert a powerful influence on the animal system; and hence, instead of being a nutriment, may become either a *poison* or a *medicine*,—according to the quantity taken, or the manner in which it is employed. Indeed, the remark may be made general,—that the chief distinction between a poison and an active medicine, consists in the size of the dose, and the skill of the doctor. A drug that has no power to do mischief, or to disturb the system, can possess but feeble medicinal virtues; and, if it deserve notice at all, should be classed among the *aliments*, rather than in the *materia medica*. Accordingly, we find the poisonous plants furnishing the multifarious ingredients of the apothecary's shop,—while the simple grasses, in their sound and unsophisticated condition, yield nothing but the wholesome materials for food and nourishment, It is true, that human ingenuity has extracted a potent medical agent, in the form of *alcohol*, from the fermented seeds and juices of the *gramineæ*,—and it is equally true, that man has wickedly converted that *extreme medicine* into his daily beverage: but this is only a signal instance of his depravity, in perverting the blessings bestowed on him,—and argues nothing against the intrinsic value of the material thus abused, it merely illustrates the ancient truth—*corruptio optimi pessima*,—that the prostitution of the best things produces the vilest results.

(*To be continued.*)

* We cannot but remark, says the botanical editor of Rees's Cyclopœdia, what extraordinary celebrity is attached, every now and then, to one grass or other, and how their fame passes away 'like the morning cloud,' while the best graziers scarcely know, perhaps, better than their fat cattle, any thing of the nature of the common never-failing herbage, to which they are both so much indebted.—*Art. Panicum.*

* The *quality* of grain, and of the flour manufactured from it, may be materially injured by incipient vegetation: The process of germination produces a chemical change in the seeds, and renders the farina unfit for culinary purposes: Hence it is impossible for the miller to make good flour from grain that has sprouted.

THE PEACH—IMPORTANT EXPERIMENT.

From the Albany Cultivator.

Messrs. Gaylord and Tucker—In the spring of 1837, I wrote to Judge Buel, asking him to join me in experiments on the peach tree with saltpetre, and proposed to give the result through the medium of the Cultivator to the public. I gave as my reason for that request, that as far as my observations extended, I had always observed that on soils containing nitre and muriate of soda, the peach tree lives luxuriantly to an advanced age, while upon soils immediately adjoining, immature decay takes place, and the tree seldom attains the age of seven years. As instances in vindication of this occur so frequently, I have been astonished to see them passed over without notice, and now advert to some of them to establish the truth of this position. Peach trees growing in the site where once stood a dwelling, generally live to an old age, the soil of which, by analysis, will give a proportion of nitre. The same thing occurs in many districts of the west and south-west; upon one farm the occupant has no difficulty in having good peaches, while his neighbor finds it a laborious task to prolong the life of the tree to a few years, and on well cultivated farms near the seaboard. I have been informed, they have but little difficulty in growing this tree. Having these and other instances for my guidance, I commenced experiments with salt and salt-petre, in the year 1836, upon an orchard six years old; clover was sown upon it that spring, and it remained in grass till last fall, when it was ploughed and sown in wheat and clover this spring. The trees in '36 were

full of worms; some of the trees were dead, others apparently dying, and but very few put on the appearance of health; such was its distempered condition that some of my friends advised me to cut down about one-half of those that yet showed life, saying that such was the practice of peach growers. I thought it would be a bad practice for a physician to destroy one or more of a family to prevent disease from spreading, and after cutting down those that were dead, I commenced operations on the balance with equal quantities of salt and saltpetre combined, applying about a half a pound upon the surface and in contact with the trunk of the tree; then sowed it broadcast over part of the orchard, at the rate of about two bushels per acre. The result of this application, to the surprise of my friends, was the appearance of perfect health, with new and vigorous shoots, the trees full of fruit, which matured with increased size and improved flavor. Towards the last of March, and again in May and September, 1837, I applied the same ingredients in different proportions without observing much difference in the effect; though I have since thought that where I applied the saltpetre alone, and where the largest portion of the mixture was nitre, the effect was best; but in consequence of the price of saltpetre, I have endeavored to ascertain the smallest quantity that should be used, and I would not advise less than one-eighth, though I should prefer one-fourth or more. My trees this fall (1837) were free from worms, all doing well, and I have found no further use for the axe in the orchard. In the year 1838, I applied the mixture to a part of my orchard in March, the other part received the application in June and September; upon that part done in March, I had an abundance of fruit, while those done in the 6th and 8th months were comparatively destitute of fruit, it having been killed by a late frost. It occurred to me that I was indebted to the salt, &c., for the abundance of fruit on the trees done in March, by its retarding vegetation; and from an experiment made in '39, it appeared to be the case, though I have never considered it of sufficient importance to repeat it, for the purpose of testing it further.

In regard to the best time to make this application, I would say about the first of April, and to those trees having worms in them again in June or September, as the appearance of the worm may indicate its necessity, using about two-thirds of the usual quantity for the June or September dressing, and to be used only in contact with the trunk of the tree. I have not discovered any great benefit from sowing it broadcast over the orchard every year; I prefer to do this every second or third year. If the tree is injured very much by the worm, to wash the bark of the trunk with a solution of this mixture and water might be of service, being careful not to apply too much; this should not prevent its application in a powdered state. To my trees, planted in the fall and spring, I apply as soon as done planting in the spring about one ounce upon the surface, in contact with the trunk of the tree, and repeat this quantity again early in June or September, the peach worm at these two last periods, being in their infancy, are destroyed.

In August, after one application of this mixture to my young trees in the spring, I have taken several worms from off the outer bark of a tree, bedded in gum, they having punctured it in a number of places, but did not penetrate to do any injury to the inner bark, while the next tree left without the above mixture was nearly destroyed, the inner bark being eaten for more than two-thirds around the tree. It might be supposed that the salt and saltpetre would produce instantaneous death, but this is not the case; I have kept them half covered in a solution of salt and water, and saltpetre and water, and in these two articles combined for several hours without causing death; they will avoid its approach, and will not remain in it unless compelled by necessity.

In compliance with the promise heretofore made, I have endeavored to give in a brief manner my practice on the peach tree for five years, from which I have no reason to make a change, but many inducements for a continuance of the practice. If you consider it sufficiently important for publication, it is at your disposal, and if any benefit should arise therefrom, be assured it would be the highest reward for any services of mine that could be tendered to, yours,

LYTTLETON PHYSICK.

Ararat Farm, Cecil county, Md.,
July 6, 1841.

THE ALPACA.

From the (London) Farmers' Magazine.

The Alpaca is being attempted to be naturalized in Britain, and is now possessed by several noblemen and gentlemen in England and Scotland. A memoir on the subject has been addressed to the proprietors of waste lands by Mr. Walton, and is now published in the shape of a pamphlet by Smith and Elder, London; and Connell, Liverpool. The animal is a native of the Andes Cordilleras, of Peru, and inhabits the cold regions elevated 8,000 to 12,000 feet above the level of the sea. There they find their favorite and peculiar beverage, the ichu plant, one of the gramineous tribe, which grows to a considerable height, and produces in suitable places some good natural meadows. The naturalists place them in the natural order of "Ruminantia," but they also bear a comparison with the "Capridee;" and in some properties approach the camel. The constitution is hardy, and adapted to cold, mountainous regions. The only doubt entertained with regard to our climate is the humidity, our latitude producing that noxious quality, though the degree of dry cold is less intense. The wool is fine and glossy, and resembles silk more than common wools; considerable quantities have been imported, and in the custom-house returns it is included under the article "mohair yarn," which is manufactured into camlets and moreens. Many persons think alpaca wool will suit the manufacture of Cashmere shawls. Fine goods are mixed with alpaca wool, and in many cases it passes for silk.

The flesh resembles that of the deer, and is well adapted for hams. The skin is useful in book-binding, and in making belts and straps. The average weight of the carcass of the alpaca is about 200 lbs., and many of them much exceed that weight. In our country the carcass is rather more regarded than the wool; and, under our

present habits of living, any animal less useful for producing animal food would not compete with our known breed. But it appears the alpaca is recommended for situations not used for sheep—or, at least, very rarely—and if they succeed in parks and enclosures in the first place, the trial in exposed situations will be very interesting. Such experiments, with a view to add to production, and the employment of labor especially, claim the attention of the wealthy and the support of the community. At present the few attempts do not warrant any general conclusion, but are favorable so far as they have gone. The patriotic individuals who now possess the animals will no doubt bring their capabilities to a just and satisfactory test.

BLISTER FLIES.

From the Kentucky Farmer.

We are sorry to hear that these insects are doing much mischief in various quarters. We hear of their ravages in Clarke and Woodford, and have seen a specimen of their labors in this county. They attack a crop of beets, potatoes, or other plants having soft succulent leaves, and they despoil them utterly of their foliage. The consequence is, great damage is done to the crops attacked.

We are not entomologist enough to describe the fly technically; but believe it is a species of the *cantharides* genus. At any rate, we are advised by Dr. Parker of Shelby and Dr. Martin of Clarke, that they make a capital blister. Dr. Parker asserts this upon late experience; and we suggest that, as some small indemnity for their ravages, it would be well to set the children of a farm about gathering them for sale to the apothecaries. They are supposed to be worth quite as much as the Spanish flies, and owing to their great number, it would be a lucrative business to get two, three or four dollars a pound for them. A farmer told us he shook at least 500 off one beet; and they could nearly all have been taken in one minute and bottled, being sluggish in their action.

It is a black or dark-colored fly, near an inch long, with a small head proportioned to the size of the body, which enlarges towards the tail. There is a white stripe along the back. We have had but little opportunity of making any observation on the "black bug" as some call the insect; and would be thankful to any one for a description of it as well as a suggestion of the means of preventing its ravages. They have been increasing of late years.

TOMATO FIGS.

From the American Farmer.

Patent Office, July 10, 1841.

Dear sir,—The medicinal qualities of tomatoes have greatly increased their cultivation, and every new preparation of the article is deserving consideration. A sample of "tomato figs" has just been deposited at the patent office of a very superior quality,—from the taste I should suppose all the good qualities of the fruit are retained. In appearance the drum of tomatoes resembles one of figs so nearly that they might easily be mistaken for the same.

The sample is deposited by Mrs. Steiger, of this city, and the recipe transmitted with it is enclosed for publication. It is deeply to be regretted that since the periodicals of the day are open to communications, so many valuable improvements are lost to the world barely for the want of publicity. Others may have dried the tomatoes with a recipe, however less successful.

Very respectfully, H. L. ELLSWORTH.

Hon. J. S. Skinner.

Take six pounds of sugar to one peck (or 16 lbs.) of the fruit. Scald and remove the skin of the fruit in the usual way. Cook them over a fire, their own juice being sufficient without the addition of water, until the sugar penetrates and they are clarified. They are then taken out, spread on dishes, flattened and dried in the sun. A small quantity of the syrup should be occasionally sprinkled over them whilst drying; after which, pack them down in boxes, treating each layer with powdered sugar. The syrup is afterwards concentrated and bottled for use. They keep well from year to year, and retain surprisingly their flavor, which is nearly that of the best quality of fresh figs. The pear-shaped or single tomatoes answer the purpose best. Ordinary brown sugar may be used, a large portion of which is retained in the syrup.

TABLE OF MANURES:—THEIR PROPERTIES AND MODE OF APPLICATION; FOR THE USE OF THE AGRICULTURIST; BY JOHN ROBINSON, M. B.

From the (London) Farmers' Magazine.

Manures are intended to supply food to plants and ultimately to become constituent parts of them. Thus, when we wish to apply manure in the case of wheat, it will be proper to ascertain from the stalk and grain, what substances are required. In the stalk we have potash combined with silicious acid; if the soil, then, contain neither of these constituents, we must supply them by artificial means or by manuring. In the grain, again, we find, on analysis, phosphoric acid in combination with magnesia and potash. In like manner, these must be supplied, if deficient in the soil. The usual manures give these substances, though the subject is not scientifically understood by mere practical men.

In the cultivation of the turnip this is strikingly clear. As that vegetable contains phosphoric acid in quantity, phosphoric acid, if not present in the soil in sufficient quantity, as it rarely is, must be supplied to it. For instance, bone dust answers this purpose, as bone is composed chiefly of phosphoric acid and lime. The excrements of man and animals contain also phosphoric acid; fish manure acts precisely in the same way, as fish contain phosphoric acid in abundance. Fish oil is proper for turnips on the same grounds. The instances might be multiplied to a great length. It may not here be out of place to remark that all substances, whether organic, earthy, or saline, which are employed to fertilize the soil, or become the food of plants, can only be render-

ed thus serviceable to vegetation when they are presented to the roots in a fluid state; and such is the fact, that the compost of the farm-yard, the crushed bones of the turnip cultivator, the oil and bones of fish, the gypsum of the grazier, the earths, lime, magnesia, and even silica, and all the saline manures, are dissolved by some process or other, before they can be absorbed by vegetables.

SOURCE OF THE CARBON OF PLANTS.

From Johnston's Lectures.

We have already seen reason to believe that carbon is incapable of entering directly, in its solid state, into the circulation of plants. It is generally considered, indeed, that solid substances of every kind are unfit for being taken up by the organs of plants, and that only such as are in the liquid or gaseous state, can be absorbed by the minute vessels of which the cellular substances of the roots and leaves of plants are composed. Carbon, therefore, must enter either in the gaseous or liquid form, but from what *source* must it be derived? There are but two sources from which it can be obtained,—the soil in which the plant grows—and the air by which its stem and leaves are surrounded.

In the soil much vegetable matter is often present, and the farmer adds vegetable manure in large quantities with the view of providing food for his intended crop. Are plants really fed by the vegetable matter which exists in the soil, or by the vegetable manure that is added to it?

This question has an important practical bearing. Let us, therefore, submit it to a thorough examination.

We know, from sacred history, what reason and science concur in confirming, that there was a time when no vegetable matter existed in the soil which overspread the earth's surface. The first plants must have grown without the aid of either animal or vegetable matter—that is, they must have been nourished from the air.

It is known that certain marly soils, raised from a great depth beneath the surface, and containing apparently no vegetable matter, will yet, without manure, yield luxuriant crops. The carbon in such cases must also have been derived from the air.

You know that some plants grow and increase in size when suspended in the air, and without being in contact with the soil.

You know also, that many plants—bulbous flower roots for example,—will grow and flourish in pure water only, provided they are open to the access of the atmospheric air. Seeds also will germinate, and, when duly watered, will rise into plants, though sown in substances that contain no trace of vegetable matter.

Thus De Saussure found that two beans, when caused to vegetate in the open air on pounded flints, doubled the weight of the carbon they originally contained.

Under similar circumstances Boussingault found the seeds of trefoil increase in weight 2½ times, and wheat gave plants equal in weight, when dry, to twice that of the original grains.* The source of the carbon in all these cases cannot be doubted.

When lands are impoverished, you lay them down to grass, and the longer they lie undisturbed the richer in vegetable matter does the soil become. When broke up, you find a black fertile mould where little trace of organic matter had previously existed.

The same observation applies to lands long under wood. The vegetable matter increases, the soil improves, and when cleared and ploughed it yields abundant crops of corn.

Do grasses and trees derive their carbon from the soil? Then how, by their growth, do they increase the quantity of carbonaceous matter which the soil contains? It is obvious that, taken as a whole, they must draw from the air not only as much as is contained in their own substance, but an excess also, which they impart to the soil.

But on this point the rapid growth of peat may be considered as absolutely conclusive. A tree falls across a little running stream, dams up the water, and produces a marshy spot. Rushes and reeds spring up, mosses take root and grow. Year after year new shoots are sent forth, and the old plants die. Vegetable matter accumulates; a bog, and finally a thick bed of peat is formed.

Nor does this peat form and accumulate at the expense of one species or genus of plants only, Latitude and local situation are the circumstances which chiefly affect this accumulation of vegetable matter on the soil. In our own country, the lowest layers of peat are formed of aquatic plants, the next of mosses, and the highest of heath. In Tierra del Fuego, "nearly every patch of level ground is covered by two species of plants (*asteliapumila* of Brown, and *donatia magellanica*), which by their joint decay, compose a thick bed of elastic peat." "In the Falkland Islands almost every kind of plant, even the coarse grass which covers the whole surface of the islands, becomes converted into this substance."*

Whence have all these plants derived their carbon? The quantity originally contained in the soil is, after a lapse of years, increased ten thousand fold. Has dead matter the power of reproducing itself? You will answer at once, that all these plants must have grown at the expense of the air, must have lived on the carbon it was capable of affording them, and as they died must have left this carbon in a state unfit to nourish the succeeding races.

This reasoning appears unobjectionable, and, from the entire group of facts, we seem justified in concluding that plants every where, and under all circumstances, derive the whole of their carbon from the atmosphere.

In certain extreme cases, as in those of plants growing in the air and in soils perfectly void of organic matter, this conclusion must be absolutely true. The phenomena admit of no other interpretation. But is it as strictly true of the more usual forms of vegetable life, or in the ordinary circumstances in which plants grow spontaneously or are cultivated by the art of man? Has the

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* Ann. de Chim. et de Phys. lxvii. p. 1.

* *Darwin's Researches in Geology and Natural History*, pp. 349-50. Dr. Greville informs me that the *astelia* approaches more nearly to the junceæ or *rush tribe*, and the donatia to our tufted saxifrages, than to any other British plants.

vegetable matter of the soil no connexion with the growth of the trees or herbage?—does it yield them no regular supplies of nourishment? Does nature every where form a vegetable mould on which her wild flowers may blossom and her primeval forests raise their lofty heads? Has the agricultural experience of all ages and of all countries led the practical farmer to imitate nature in preparing such a soil? Does nature work in vain?—is all this experience to be at once rejected?

While we draw conclusions, legitimate in kind, we must be cautious how, in degree, we extend them beyond our premises.

The consideration of one or two facts will show that our general conclusion must either be modified or more cautiously expressed.

It is true that plants will, in certain circumstances, grow in a soil containing no sensible quantity of organic matter—but it is also true, *generally*, that they do not luxuriate or readily ripen their seed in such a soil.

It is consistent with almost universal observation, that the same soil is more productive when organic matter is present, than when it is wholly absent.

That if the crop be carried off a field, less organic matter is left in the soil than it contained when the crop began to grow, and that by constant cropping the soil is gradually exhausted of organic matter.

Now it must be granted that tillage alone, without cropping, would gradually lessen the amount of organic matter in the soil, by continually exposing it to the air and hastening its decay and resolution into gaseous substances, which escape into the atmosphere. But two years' open fallow, with constant stirring of the land, will not rob it of vegetable matter so effectually as a year of fallow succeeded by a crop of wheat. Some of the vegetable matter, therefore, which the soil contained when the seed was sown, must be carried off the field in the crop.

The conclusion, therefore, seems to be reasonable and legitimate, that the crop which we remove from a field has not derived all its carbon directly from the air—but has extracted a portion of it immediately from the soil. It is to supply this supposed loss, that the practical farmer finds it necessary to restore to the land in the form of manure—among other substances—the carbon also of which the straw or hay had robbed the soil.

But how is this reconcileable with our previous conclusion, that the whole of the carbon is derived from the air? The difficulty is of easy solution.

A seed germinates in a soil in which no vegetable matter exists; it sprouts vigorously, increases then slowly, grows languidly at the expense of the air, and the plant dies stunted or immature. But in dying it imparts vegetable matter to the soil, on which the next seed thrives better—drawing support not only from the air, but by its roots from the soil also. The death of this second plant enriches the soil further, and thus, while each succeeding plant is partly nourished by food from the earth, yet each, when it ceases to live, imparts to the soil all the carbon which during its life it has extracted from the air. Let the quantity which each plant thus returns to the soil, exceed what it has drawn from it by only one ten-thousandth of the whole, and—unless other causes intervene—the vegetable matter in the soil must increase.

Thus while it is strictly true that the carbon contained in all plants has *been originally* derived from the air—it is not true that the *whole* of what is contained in any one crop we raise, is *directly* derived from the atmosphere—the proportion it draws from the soil is dependent upon numerous and varied circumstances.

The history of vegetable growth, therefore—in so far at least as the increase of the carbon is concerned—may be thus simply stated:—

A plant grows partly at the expense of the soil, and partly at that of the air. When it reaches maturity, or when winter arrives, it dies. The dead vegetable matter decays, a part of it is resolved into gaseous matter and escapes into the air, a part remains and is incorporated with the soil. If that which remains be greater in quantity than that which the plant in growing derived from the soil, the vegetable matter will increase; if less, it will diminish.

In warm climates the decay of dead vegetable matter is more rapid, and therefore the portion left in the soil will be less than in more temperate regions—in other words, the vegetable matter in the soil will increase less rapidly—it may not increase at all.

As we advance into colder countries, the decay and disappearance of dead vegetable matter, in the form of gaseous substances which escape into the atmosphere, become more slow, till at length, between the parallels of 40° and 45°, it begins to accumulate in vast quantities in favorable situations; forming peat bogs of greater or less extent. While the living plant here, as in warm climates, derives carbon both from the earth and from the air, the dead plant, during its slow and partial decay, restores little to the atmosphere, and therefore adds rapidly to the vegetable matter of the soil.

Again, in one and the same climate, the decay of vegetable matter, and its conversion into gaseous substances, is more rapid, in proportion to the frequency with which it is disturbed or exposed to the action of the sun and air. Hence this decay may be comparatively slow in shady woods and in fields covered by a thick sward of grass; and in such situations organic matter may accumulate, while it rapidly diminishes in an uncovered soil, or in fields repeatedly ploughed and subjected to frequent cropping.*

Being thus fitted, by nature, to draw their sustenance—now from the earth, now from the air, and now from both, according as they can most readily obtain it—plants are capable of living, though rarely a robust life, at the expense of either. The proportion of their food which they actually derive from each source, will depend upon many circumstances,—on the nature of the plant itself—on the period of its growth—on the soil in which it is planted—on the abundance of food presented to either extremity—on the warmth and moisture of the climate—on the duration and intensity of the sunshine, and other

* In removing a crop we take away both what the plants have received from the earth and what they have absorbed from the air—the materials, in short intended by nature to restore the loss of vegetable matter arising from the natural decay.

circumstances of a similar kind—so that the only general law seems to be, that, like animals plants have also the power of adapting themselves, to a certain extent to the cenditions in which they are placed ; and of supporting life by the aid of such sustenance as may be within their reach.

Such a view of the course of nature in the vegetable kingdom is consistent, I believe, with all known facts, And that the Deity has bountifully fitted the various orders of plants—with which the surface of the earth is at once beautified and rendered capable of supporting animal life—to draw their nourishment, in some spots more from the air, in others more from the soil, is only in accordance with the numerous provisions we every where perceive, for the preservation and continuance of the present condition of things.

By taking a one-sided view of nature, we may arrive at startling conclusions—correct, if taken as partial truths, yet false if advanced as general propositions—and fitted to lead into earror, such as have not the requisite knowledge to enable them to judge for themselves—or such as, coubtful of their own judgment, are willing to yield assent to the authority of a name.

Of this kind appears, at first sight, to be the statement of Liebig, that "when a plant is quite matured, and when the organs by which it obtains food from the atmosphere are formed, the carbonic acid of the soil is no farther required"—and that, "during the heat of summer it derives its carbon exclusively from the atmosphere."*

A little consideration will show us that, while the proposition contained in the former quotation may be entertained and advanced as a *matter of opinion*—the latter is obviously incorrect. In summer, when the sun shines the brightest, and for the greatest number of hours, the evaporation from the leaves of all plants (their insensible perspiration) is the greatest†—the largest supply of water, therefore, must at this season be absorbed by the roots, and transmitted upwards to the leaves. But this water, before it enters the roots, has derived carbonic acid and other soluble substances from the air and from the soil, in as large quantity at this period, as at any other during the growth of the plant; and these substances it will carry with it in its progress through the roots and the stem.

Are the functions of the root changed at this stage of the plant's growth? Do they now absorb pure water only, carefully separating and refusing to admit, even such substances as are held in *solution?* Or do the same materials which minister to the growth of the plant in its earlier stages, now pass upwards to the leaf and return again in the course of circulation unchanged and unemployed, to be again rejected at the roots? Does all this take place in the height of summer, while the plant is still rapidly increasing in size? The opinion is neither supported by facts nor consistent with analogy.

But such an opinion, however the words above quoted may mislead some, is not intended to be advanced by Liebig; for in the following page he says, that "the power which roots possess of taking up nourishment does not cease so long as nutriment is present." In summer, therefore, as well as in spring or in autumn, the plant must be ever absorbing nourishment by these roots, if the soil is capable of affording it—and thus, in the general vegetation of the globe, the increase of carbon in growing plants must, at every season of the year, be partly derived from the vegetable matter of the soil in which they grow.

* Organic Chemistry applied to Agriculture, p. 48.
† Lindley's Theory of Horticulture, p. 49.

MOVEMENT OF THE PEOPLE FOR PROMOTING BANKING REFORM AND THE RESUMPTION AND MAINTENANCE OF SPECIE PAYMENTS.

In this number we are much gratified to publish the early transactions of the recently formed *Association for promoting Currency and Banking Reform.* All persons who are friendly to the great objects proposed, and opposed to the extension of the present and long continued procedure of the irresponsible banks of Virginia, and especially to the *permanent policy* of an irredeemable and depreciated paper currency, are earnestly requested to aid the efforts of the Association, by forming other branches, and procuring signatures to petitions for the resumption and maintenance of specie payments.

ASSOCIATION FOR PROMOTING CURRENCY AND BANKING REFORM.

By order of the Executive Committee for Petersburg.

An *Association for promoting Currency and Banking Reform* has been organized for the town of Petersburg, and has commenced operations. The Executive Committee thereof respectfully invite the co-operation of all those who are willing to do any thing for the great and all-important objects of the association; and to facilitate such co-operation, some general recommendations will here be submitted to the public.

It is recommended that the formation of *branches* of the association be forthwith commenced in every county and town; each branch to choose its own constitution and rules, its own officers, and determine its particular mode of operation; but all the branches to form one general association, and to act in concert for the great common object, by means of a common representative body, or Central Executive Committee.

It is also recommended that petitions be prepared and offered for general signature in every county and town in Virginia, praying for the resumption and maintenance of specie payments by the banks.

The form of constitution of the Petersburg Association will be copied below, and also the Petition adopted to be offered for general signature in Petersburg. These, as mere forms, may facilitate similar movements elsewhere, and may be altered to any extent, or wholly substituted, wherever other forms may be preferred.

Until other branches of the Association are in operation, and a Central Executive Committee shall have been formed, those persons who may desire to aid the cause, and to act in concert, may communicate with the Executive Committee of the Petersburg Association.

Constitution.

We, the undersigned, hereby unite to aid in forming an *Association for promoting Currency and Banking Reform*; and agree to be governed by the following constitution. The means to be used for the objects of the association, will be to aid the diffusion of correct information in regard to the uses and abuses of banking and currency, through the circulation of cheap publications, and by any other available mode for spreading knowledge and truth on this subject.

§ 1. Any person, friendly to the objects of the Association, may become a member by signing this constitution, and paying to the Treasurer an entrance fee of one dollar.

§ 2. The officers shall be an Executive Committee of seven members, to be elected by ballot in general meeting of the Association, to serve one year, or until a new election shall be held. The Executive Committee shall choose out of their body the President, Secretary and Treasurer of the Association, who shall have the powers, and perform the duties, usually belonging to these several officers.

§ 3. The Executive Committee shall act according to its discretion, for furthering the objects of the Association, in all matters not otherwise directed or controlled by the Association in general meeting.

§ 4. Each member shall pay (besides his entrance fee before mentioned,) one dollar at each annual meeting.

§ 5. Seven members shall constitute a quorum at any meeting of the Association; and three members a quorum of the Executive Committee.

§ 6. This constitution may be amended or altered by a majority of the members present at any meeting of the Association, after notice having been given of the proposal to amend at the previous meeting, or, otherwise, to the Executive Committee one month or more previous to the amending.

TO THE GENERAL ASSEMBLY OF VIRGINIA:

The petition of the subscribers, voters or residents of the town of Petersburg, respectfully showeth:

That the general currency of any country being in irredeemable and therefore depreciated paper money, must always cause great and still increasing evils to the property interests, habits and morals of the people.

That the losses and injuries caused by such depreciated currency, are principally and necessarily borne by the producing classes, whose earnings and products are either directly made by honest labor, or derived from real capital which is itself the product of previous labor; while the profits and benefits of the irredeemable paper system accrue to other classes, and especially to the banks.

That since the banks stopped payment in May 1837, the people of Virginia have been suffering under the evils of an irredeemable and depreciated paper currency, and that forming the entire currency—with the exception of the short intervals of time, when the banks truly and fully paid their notes and other dues in specie.

That immediately after the first stoppage of payments by the banks, the General Assembly was convened for the purpose, and hastened to pass an act of indemnity for the violation of law, and of indulgence for the continued denial of payment by the banks, to a certain future limit of time; and that like indulgence has been again since extended, and before being extended, the privilege was assumed and acted on by the banks, in violation of the then existing law.

That though the last such legislative act of indulgence to non-paying banks is to expire by its own limitation next January, still, judging from past experience, your petitioners fear that the indulgence will be again and again extended by law, to the continued and increasing injury of the community.

Therefore, we pray of your honorable body, that no further extension may be permitted of the indulgence to the banks in their denial of payment of their notes and other debts; and that such enactments shall be made as will hereafter effectually prevent any bank of this state from withholding payment—or, at least, shall prevent the banks making profit (as heretofore and now,) by refusing to pay their dues, and inflicting on the community all the evils of an irredeemable and depreciated paper currency.

SEASON AND CROPS.

On the evening of the day when our last remarks on this subject were printed (July 30th) the much desired rain fell here in abundance, and generally in all the neighboring counties within a few days thereafter. There have been repeated and abundant rains since, almost every where in this region; but still there are exceptions. The corn crop will be a good one.

The wheat crop so far as known, seems to have fallen short of even the last stated expectations. On the lower James River, however, the product has been better than was supposed after harvest. We regret that the facts communicated to us on this head have been very few. A farmer of Fauquier, and one of our subscribers, wrote as follows, on August 12th: "The crop [of wheat] in Fauquier, from the best information I can obtain is greatly below an average; in very many instances it yields little more than half the estimated quantity, in very few instances more than two-thirds. Quality good."

Within a week after our last month's statement that the prices of wheat here and in Richmond were too low compared to those of New York

and Baltimore, the prices rose here from 110 for red wheat, and 115 for white, to 125 and 130, at which prices some of the river crops were sold. Most of the large crops however have been held for higher prices, and as we thought injudiciously. However the last news from England seems to indicate that wheat will be higher, though there is no advance here yet on the prices stated above, to this date.

Judging merely from the season, we infer that, notwithstanding the very bad early and planting season, an average crop of tobacco may be expected, provided there should be a warm autumn and no early frost.—Ed. F. R.

August 25th, 1841.

P. S. On 27th, the price of wheat, as we anticipated above, has advanced--to $1.30 for red, and $1.35 for white.

[Not having room for the communication to which the following was appended as a postscript, is the cause of presenting this alone.]

"*Queen Ann's, Md., Aug.* 14, 1841.

"For the last fifteen days our grounds have been saturated by rain. In consequenne of our cold spring, our corn was planted late; it was scarcely checked by the drought, much of it is now in fresh silk, and should the fall be favorable, we shall make enough to serve us, and some for market; but should there be a cool month of September, or an early frost in October, the crop will be small."

A SAMPLE OF EDITORIAL AND PUBLICATION PROFIT.

In June and the early part of July we performed part of our annual task of sending bills for arrears of subscription money, due from one class of debtors only, that is, those whose names had been *erased from the list,* at the end of the last volume and previously for non-payment. These bills amounted to between $4000 and $5000. Now how much does the reader guess has been since received, from the many individuals thus reminded of their neglected obligations? A novice in such business would perhaps guess a thousand dollars—certainly not less than five hundred —or one more experienced may suppose $100 to $200. But the true product of the problem is surprising even to us. The fact is, that to this 25th day of August, not one of these bills or one cent thereon has been paid!!!

There is another large class of debtors to whom no bills have been yet sent, and we scarcely think it worth while to subject them to pay the postage on their bills, or for us to take the trouble of writing them, for the very small chance of receiving any compensating return. These are some hundreds of the subscribers to the Carolina Planter, transferred to our list, and who did not discontinue their subscription, and who received the substituted Farmers' Register for 6 months (until it was stopped by our own act,) without making any compensation.

On the cover of this number will be marked the amount due (if any thing) from such existing subscriber, for the current or any previous volumes.

With a subscription list larger than at any previous time, and of more value according to the amount which should have been paid by subscribers, our publication has never been of so little profit as for this year. If this is owing to the "disordered state of the currency," we are heavily punished by the operation of the swindling banking system for the efforts we make to put it down.

SUMMARY OF NEWS.

Friday, August 6, 1841.

The Great Western steam-ship arrived at New York on the 31st of July, bringing accounts from England to July 14th.

The results of the elections of Great Britain had been so nearly all reported, that it was certain that the Tory or Conservative party will have a strong majority in the House of Commons. Of course the present Whig ministry will go out. Sir Robert Peel will be the head of the Tory ministry. The corn laws will not be repealed, nor free trade otherwise greatly forwarded.

Daniel O'Connell had lost his election for Dublin, but will be in parliament as member elect of Meath.

The insurgents of Candia have had several sanguinary conflicts with the Turkish forces, and are still gaining strength.

The emperor of Russia has assumed the title of "Defender of the Christians of the East." This assumption is full of meaning.

The soldiers who formed the garrison of Albucerres, in Spain, had mutinied, overcome all authority there, and committed the greatest excesses, which continued for more than a week. The last report stated that the mutineers had submitted.

The report of the English corn market and prospects was such as to raise the price of flour in New York fifty cents the barrel.

In Georgia the proper steps are now taking to oppose the swindling banking system, and compel banks either to resume payment, or cease to defraud the public by keeping their depreciated paper money afloat. The Augusta Chronicle contains the following notice. The frauds of banks and of the paper system must indeed be enormous, when the commercial community stands up against them. This movement commenced at Macon, and is called the "Macon specific."

"*Public notice.*—In consequence of the great inconvenience and loss attending the circulation of a depreciated and fluctuating currency; believing it to be the inte-

rest equally of the planter, as of the merchant, to have a sound currency of uniform value; and believing that this can be secured only by encouraging the circulation of the notes of such banks as pay specie for their issues, promptly, to all demands; and also believing that it will result to the material interest of the whole state; by reducing the price of merchandise, and enabling the planter to receive a sound circulating medium for his crop, the undersigned, merchants, factors and citizens of Augusta, have determined that from the opening of the fall market, for the present growing crop, say after the first of October next, they will not receive in payment, or pay out, the bills of any of the suspended banks, except at their current market value, taking the bills of specie paying banks as the standard. [Signed by 134 commercial firms, factors and citizens of Augusta.]

"*Resumption.*—A gentleman from Alabama informs us, that there the people are coming very generally to repudiate all bank notes which are not payable in specie on demand. They have suffered by the depreciation of bank notes, and by the failure of one bank after another, and have been wronged in so many ways by the banks, that they are becoming determined in their resistance to the farther continuance of the fraudulent system. Gold and silver are coming again into circulation, for the people will part with their property for nothing else. A few private banks, paying specie, are getting into operation, which furnish a sound paper currency; but they are not much known. From Georgia and from Michigan we have published the proceedings of public meetings repudiating the paper of suspended banks. From three states, therefore, we have learned that the principles of liberty, not regulation, are purifying the currency. Another year of the uninterrupted operation of these principles would probably restore soundness to the currency in most of the states; and when so restored, the currency would remain sound. The laws of nature cure evils, but legislative quackery plasters them over, so that the first time the patient takes cold, they break out again. If the people could see the operations of nature for another year, the doctors would be compelled to throw away their pills, and allow the patients to get well.—*Journal of Commerce.*

Specie.—The packet ship Albany, at New York, from Havre, brings 1,052,800 francs.

The steam-ship Acadia arrived at Boston on the 2d, bringing accounts to July 20th, 6 days later than those by the Great Western.

The election returns were nearly all received. The Conservative or Tory party will have a majority of about 80 in the House of Commons.

The cotton market remains as before.

"London, July 17. Cotton—There has been a fair demand this week, and full prices paid. The private transactions amount to 1340 bales Surat at 4d to 5¾d, 900 Madras at 4¾d to 5d, 60 Bengal at 4¼ to 4½d, 300 Boweds at 5¼ to 6¾ in bond, and 150 West India at 7d to 8d per lb. duty paid."

The prospect of crops was favorable.

A very threatening riot or insurrection had taken place in Toulouse, (France,) on the 12th, which was quelled on the second day by military force.

The town of Villa da Prain, in the island of Terceira, has been destroyed by a series of earthquakes, from 12th to 15th of June.

The Greeks in Candia have suffered severe losses in recent skirmishes. The Turkish force there is eight thousand strong.

Samuel Swartwout, the great defaulter, has returned from Europe in the Acadia. We presume that he has heard of so many defalcations and robberies by officers in trust, that he supposes he will now find a large circle of such associates and companions in misfortune, and all of them gentlemen of high character and respectability. It is reported that Swartwout's successor, Hoyt, though so short a time collector of New York, has managed to be a defaulter for $150,000.

The Jacksonville (Il.) bank robbers have been discovered and arrested, and, as we ventured to assume at first, they prove to be an officer of the bank—to wit, Town, the teller. Mather, the president is implicated in the charge. Nearly all the stolen money had been recovered.

A regular and extensive conspiracy for insurrection among the slaves, on many plantations on the lower Mississippi, was lately detected, a few days before the intended outbreak. Forty or fifty slaves have been arrested, and await their trials. White men are implicated, one of whom is in jail.

Matthias, the pretended prophet or Messiah, who made so much noise some years back in New York, died lately in the western part of North Carolina.

The levee across the river from New Orleans is still giving way. "The slide has extended a distance of about 200 feet, and the water where the caving has occurred, is 32 feet deep."—*New Orleans Bee.*

Houston, Texas, which was settled five years ago, has now four thousand inhabitants, and within the same period there have been six thousand burials, an average of nearly four for every day in the year.

The faculty of Amherst College, Massachusetts, a seventh-rate institution, have endeavored to add to their dignity (and something more perhaps) by insulting President Tyler with the offer of a diploma of Doctor of Laws.

An *Association for promoting Currency and Banking Reform* has just been organized in Petersburg; and although commenced in a *town*, under the chilling shadow of three banks, and of course obstructed by all the influence of the banks and dread of their hostility, the effort has already succeeded beyond all previous expectation. The list of members shows the names of men of all parties, (except of the party of thorough bank slaves, or advocates of a *permanent* irredeemable currency,) including some of the most respectable merchants, and also the delegate of the town of Petersburg, who was recently elected by so *surprising* a majority. The first acts of the Association are published on the previous pages of this number. It is expected that more than half the voters of Petersburg will sign the petition for resumption of bank payments, in spite of all the power and indirect influence of the banks, to the contrary. *But in the country*, where bank terrors are as yet but little felt or dreaded, far greater success may be counted on, wherever any one zealous individual will make an effort for the purpose. In the country there are very few slaves to bank power, and almost as few apologists for the swindling features of the banking system. The petition for resumption of payments, if properly presented, will obtain the signatures of four-fifths of the voters of lower and middle Virginia; and the banks will not dare to ask, nor the legislature to grant, a further suspension, termed and pretended to be *temporary*, but which in fact would be designed to be but one more of the years of the *permanent policy of an entire currency of irredeemable and depreciated bank notes.* Every bank measure and law for the last four years have been but preliminary steps to this general policy; and every argument and statement made in favor of continued temporary suspension of payment, serve as well for the permanent stoppage, and which will be openly supported, as soon as the irredeemable paper advocates are strong enough to venture to tell the truth in this respect, and avow their designed object. Let a branch of the Association be forthwith formed in every county, and a petition for resumption be signed by all who approve the measure, and before next March the present fraudulent banking system of Virginia will be controlled by law, stripped of its overwhelming power, and have infused into it something of honest and useful tendencies in relation to the public interests.

Friday August 13, 1841.

Besides the great Swartwout, another absconded defaulter has returned, and is at large at home in Connecticut. This is the Hon. Asa Child, who took only $60,000 of the rail-road fund in his charge.

Letters from New Orleans say that the sudden death of one of the tellers in the Canal Bank had caused an investigation into his accounts, which, as far as the examination had proceeded, had disclosed a deficit of over $80,000.

The report of a conspiracy for insurrection among the slaves of Louisiana turns out to be as false as such reports usually are. The slaves charged with the offence have been tried, and all acquitted. The white man has not yet been tried, but is expected to be acquitted.

Three ministers of the Gospel, or students for the ministry, belonging to an abolition institution in Illinois, lately attempted to entice some slaves across the Mississippi, (in Missouri,) to avail of their assistance to enable them to escape to Canada. The slaves agreed to the proposal, and to the appointment of a time when the deliverers were to cross the river in the night, to carry off the slaves to the Illinois shore. The slaves informed their master of the scheme, and the missionaries were arrested in the fact, and are in jail awaiting their trial. It is a states-prison crime, and if proved guilty, the holy emancipators may have ten or twelve years to play the characters of persecuted apostles and martyrs, while laboring as convicted felons.

United States Bank stock lately fell to 14¼. It has since recovered a little, and was at 14¾ in New York, Aug. 9th.

The ship Akbar has arrived at New York direct from Canton, bringing accounts to April 16, and 16 days later than before.

The English forces had made some further successful but not very important advances, but serving to confirm the impression made by preceding accounts, that Canton was in effect in their power and possession, and the Chinese unable to present any effective resistance to further encroachments. The trade was open for the present, under the British authorities over Canton. In the various affairs, from 2500 to 3000 of the Chinese troops have been killed, and 800 pieces of their cannon taken. The loss of the British in killed and wounded is almost nothing. The supply of tea by the Akbar, and the news, have reduced the price of teas, which had risen, in expectation of the trade being suspended.

The Savannah Republican of August 7th, has the following good news of the Florida war:—By the United States steamer Gen. Taylor, Capt. Peck, arrived here yesterday, we have the gratifying intelligence from Florida, that the war for the ninety-ninth time, may now be considered as at an end. Wild Cat's whole band, men, women, children and negroes, 160 in all, have come in at Tampa, and 40 more Indians of another band were on their way, and were expected at Tampa in two days. A gentleman who came on in the Gen. Taylor, says that he does not think another rifle will be fired by the enemy."

Col. Worth, as commander in chief in a Floridian summer campaign, seems to be worth more than all of his sundry predecessors put together. We rejoice to award to him due honor; but we protest in advance against a claim being thereupon set up to make Col. Worth president of the United States.

The Macon Specific.—"This great move of Georgia is destined to work a complete cure of the evils of the currency. Already exchange on Augusta is quoted in New York 1 to 1¼ instead of 15."—"All notes of the banks of Georgia are hereafter to be received and paid away at their specie current value only. All banks who resume and stay resumed, their bills go at par; all others at their current discount; acceptances paid, and drafts bought accordingly. Every price current should note the above."—*Charleston Mercury.*

We trust that "the Macon specific," or some equally active and operative remedy, will be administered to all the non-paying banks, and that every member and branch of the whole great swindling paper system may be soon forced to compliance with legal and moral obligations.

The statements rendered by the three principal banks of Virginia show their respective amounts of notes in circulation and specie to be as follows on July 1:

Bank of Virginia and branches.

Notes in circulation, - -	$2,649,798
Specie on hand, - - -	821,442

Or $1 specie for $3.22 of paper in circulation.

Farmers' Bank and branches.

Notes in circulation, - -	$2,339,015
Specie - - - - -	677,530

Or $1 specie for $3.43 of paper in circulation.

Exchange Bank and branches.

Notes in circulation, - -	$774,085
Specie on hand, - - -	233,839

Or $1 specie for $3.31 paper in circulation.

We have not yet received the report from the smaller western banks, but presume they are no better off. The general proportion of all the Virginia banks on January 1, 1841, was $1 specie to every $3.05 of paper in circulation, which was being something better prepared to pay specie than after another half year of pretended "preparation" to pay. At this rate of *preparing*, the banks of Virginia will *never* be ready to resume payments; and they never will resume, unless compelled by some stronger action than has yet operated on them.

By this morning's mails, August 13th.

The amount of loss sustained by the robberies, frauds and failures of bank officers and banks, within the last few months, is enormously large. Few would believe the astounding aggregate which they form, until they should see them enumerated and footed, which we here do, so far as we can now recollect:

U. S. Bank, suspended debt, lent to politicians, - - - - -		$20,000,000
U. States Bank, taken by officers—no vouchers, - - - - -		1,200,000
Schuylkill Bank,	Levis,	1,200,000
Manhattan Bank,	Newcomb,	50,000
do. do.	Officers and family,	500,000
Virginia Bank,	Dabney,	500,000
Georgia Bank,	Barker,	80,000
Frederick Bk., Maryland,		186,000
Norwich Railroad,	President,	10,000
Bank of Louisiana,	Teller,	60,000
Bank of Orleans,	do.	80,000
Canal Bank, New Orleans,	do.	100,000
Bank of Michigan,	Officers,	100,000
Illinois Bank,	Mr. Town,	90,000
Merchants' Bk. Balt.,	Clerk,	10,000
Tenn. Bk., at Nashville,	do.	7,000
Frankfort Bank,	President,	100,000
State Bank, Arkansas,	Fayetteville,	64,000
23 N. Y. Free Banks,		1,500,000
Pennsylvania Bank,	Smith, clerk,	100,000
Western Bank,	Israel, cashier,	15,000
Camden Bank, N. J.,	Peterson, clerk,	13,000
		$34,615,000

These are but a small part of the losses that have recently occurred. That the public may be fully enlightened as to the real amount of cost in this particular which the people bear for the *benefits* of paper money, we trust that the press in various sections of the country will make such additions as come within their knowledge and here omitted.—*Phil. Ledger.*

Richmond Prices Current.—"*Grain*—Wheat 120 to 125 cents per bushel, and 130 could we think be had for good crops. Corn getting scarce—we quote 62 to 65 cents per bushel. Oats—in vessels 40 cents, and 42 cents from depot."—*Compiler of 13th.*

The Washington papers of yesterday contain nothing as to the President's disposition of the bill for establishing a national bank; and it may be presumed now, with a great degree of confidence, that he will send it back to congress with his *veto. That result is indeed almost certain.* The bill to repeal the independent treasury law has passed both houses, and likewise abides the decision of the President.

Another Bank Robbery.—Wm. M. K. Ball, cashier of the bank of the State Bank of Arkansas, at Fayetteville, recently absconded leaving the bank minus some $64,000.—*Aug. Chron.*

Friday, August 20, 1841.

Another horrible steamboat disaster has occurred on Lake Erie. The Erie, from Buffalo to Chicago, took fire and was burnt. Nearly 200 persons were burnt or drowned, and only 27 saved, by the timely arrival of the steamboat Clinton, which was in sight of the fire, and hastened to the relief of the survivors. Most of the passengers were immigrants newly arrived from Germany. Their property, and specie, with the other cargo of the Erie, supposed to amount altogether to $300,000, was a total loss.

Mr. Justice Wiley, of New York, the celebrated compounder of bank robberies, has been arrested on the suit of the Fredericktown Bank, and bailed for $30,000.

There have been some indications, in the stealing of a piece of artillery near the Canada line, &c. of some new outbreak of "Canadian patriots." This may explain the movement of troops stated below—

"Four companies belonging to the 4th Regiment U. S. Artillery, Colonel Crane commanding, came by the Buffalo to day. Company B, Capt. Washington, and company F, Capt. Smead, remain at this post. D and K companies go on to Sacketts Harbor. The Buffalo came directly through in twenty hours from Detriot, and will be followed by the Illinois with the remainder of the troops, horses, &c."—*Buffalo Adv. 12th.*

A financier suitably rewarded at last.—"A. C. Farmington, late president of the Gallipolis Bank, alias swindling concern, has been convicted, and sentenced to the penitentiary for fifteen years."—*Phila. Ledger.*

Mr. Lyell, the distinguished English geologist, has arrived at Boston.

Another president of the United States Bank (Col. Drayton) has resigned. James Robertson, formerly cashier of the United States Branch Bank in Richmond, has been temporarily appointed to the place.

The murder of Mary Rogers, a beautiful and respectable girl, has attracted the earnest attention, and horrified the feelings of the city of New York for several weeks. The circumstances so far as known were too shocking to be stated. It is enough here to say, that after having been overpowered and brutally violated by 6 or 8 villains, she was murdered, and thrown into the Hudson. So far the perpetrators have escaped detection, if not even suspicion.

The Veto to the Bank Bill.

August 18th. The Veto of the President has been put upon the bill to establish a national bank, and the message was sent yesterday to the Senate. It is a strong and full state-rights' declaration, that leaves no ground on which to erect another bank bill of any kind. In this most important matter, John Tyler has nobly maintained the ground on which our anticipations (published on his first accession) placed him, and on which only he can stand.

Previous to sending this veto on the bank bill, the president had signed the act repealing the independent treasury law. We are not yet sure what system of treasury policy now actually exists. If the requisitions of the earliest revenue law (of 1789,) are again brought into force, the general policy is still essentially that of the independent treasury plan, and will even be more strict in excluding bank paper from the treasury. If the later law (of 1816) is the one now brought into force, *that* also will be a "sub-treasury system" for Virginia, and all other states whose banks refuse to pay specie; as by that law, the notes of specie paying banks only will be receivable as money.

We are on the eve of most important political changes, if not of party revolution, the developement of which will be commenced at Washington in a few days. Most important events *must* soon occur, though no one yet may foresee what will be the great result.

The petition for the resumption of specie payments by the Virginia banks, commenced in this town but 14 days ago, has already more than 200 signatures of voters or residents. We have no doubt that our former prediction of the signing by "more than half the voters of Petersburg" will be fulfilled, and with a considerable majority. This movement has already had some good effect in drawing forth the before concealed opinions of many of the supporters of *continued suspension*, or the still longer continuation of the present currency of irredeemable paper, from year to year. Before, all such persons were as silent as the grave, in regard to the necessity of another extension of indulgence to the banks. Now, opposition to the petitioners and their object is raised on the ground that the banks *ought not* to be required to pay next January. The reasons for still another year of suspension are quite plausible; and, moreover, they will serve as well for all future time as for the next year, and as they have served for the last four years. We should be much pleased if there could be a counter petition started in this town, asking for the continued suspension for another year, or of purport just the reverse of the other petition. We would warrant that for every signer it could obtain in Petersburg, the resumption petition would have at least five.

(*By this morning's mails,* (*Aug. 20th.*)

From the National Intelligencer of the 19th, we gather the following items: The bankrupt bill has passed both houses, and also the bill for rechartering the District banks. In the night after the veto message, an assemblage of riotous persons entered the enclosure of the President's house, and disturbed his family by insulting noises and language. A public meeting of the citizens of Washington is called by the Mayor, to express their disapprobation of this outrage. [All such use of *this species of bank argument*, however discreditable to our country, will render good service to the chief magistrate, and the cause, designed to be thus opposed.—Ed. F. R.]

The "money article" of the New York Herald of the 18th says:—

"Intelligence from Savannah states that the banks of that city have arranged to check on the North at one per cent. premium—the same as the Charleston rate—after the first day of September. It is thus seen that the exchanges between the several commercial points of the country are gradually becoming equalized and regulated without the aid of a National Bank. On New Orleans exchange is declining, in consequence of the near approach to resumption by its banks. Nothing but the healthy action of trade is wanted to equalize exchange throughout the country, and if well enough is let alone we shall soon be sound and strong."

"One hundred thousand dollars in specie have been shipped to England in the Acadia, which sailed from Boston yesterday."—*Ib.*

It seems from many indications in the papers that another bank bill will be prepared, and passed by Congress, which the friends of the measure suppose *may* obtain the signature of the president. If this *can be so*, it must indeed be a very poor bill for the purpose for which it is mostly desired to be enacted, that is, to expand still more the paper currency, to furnish more loans to the borrowing class.

No steamer arrived, though momently expected at Boston.

Friday, Aug. 27, 1841.

The steamship Columbia arrived at Boston, via Halifax, on the 19th, in fifteen days from Liverpool, bringing accounts 16 days later. No political news of importance. "Cotton had slightly declined, and the state of trade was dull. American flour had advanced in price to 28s. 6d. for the best brands, and American wheat sold at 10s. to 10s. 4d. This was in consequence of the unfavorable state of the weather, and the consequent fear of a short crop."

The late collector of New York, Jesse Hoyt, has been sued by the government, damages laid at $400,000. A like suit has also been brought against Phillips, formerly assistant cashier under Swartwout, damages laid at $600,000. The defalcation now charged against Swartwout having dwindled down to $400,000, he seems to be considered as almost innocent, and continues at large.

"The Banks of New Orleans being compelled to redeem their circulation in coin, or in default to pay 12 per cent. interest on judgment, suits are rapidly thickening, and it is thought probable there will be a speedy resumption of specie payment,—that the banks will be compelled to return to honesty, in self-defence." The same remedy has worked well on the banks of North Carolina, and will on those of Virginia, after January 1, *unless* the law should previously again suspend the penalty of 12 per cent. interest. Every note-holder who wishes to aid in compelling a return to specie payments by the banks of Virginia ought to make them endorse their notes to carry interest, though the rate is but 6 per cent. until January 1. The operation of the North Carolina 12 per cent. penalty has given an increased value to their bank notes, and thereby has withdrawn them from circulation here, to give way to the now worse currency of Virginia notes. South Carolina notes (being specie-paying) were lately worth 1½ per cent. *in Richmond* over the *best* Virginia bank notes.

The "Macon specific" is working well in the south, and will force the solvent banks to resumption and the others to bankruptcy. The like remedy has been applied in Michigan, and is now operating to good purpose in Ohio. The people have been there so cheated with depreciated or worthless paper, that very many have come to the determination to receive no depreciated bank notes, except at their market price in specie. This is what is called the "Macon specific." These and sundry other movements of the people are almost every where bringing nearer the prospect of a general resumption of specie payments. But nothing is to be hoped from legislative action, or from banking honesty, if left alone to operate.

The legislature of New Hampshire, by a vote of 138 to 99, passed a bill which makes the private property of the stockholders in all the banks hereafter to be chartered, liable to a certain extent, for the debts of the institution.—*Argus.*

"Merril B. Sherwood, we now learn on the best authority, left the country with a fine young lady, not his wife, in the ship Renown, at Philadelphia, bound for Hamburg. This distinguished man got up the Erie County Bank, swindled the state of Indiana out of $540,000, purchased the Dry Dock Bank, was made president, then resigned, and is now out of the country with his paramour, leaving his wife and children in Buffalo, to shift for themselves. It is supposed that Sherwood has taken $200,000 with him, the proceeds of all the Indiana bonds equal to half a million."—*N. Y. Herald.*

The little steamer Germ, which steamed by sea from Norfolk to New York, has gone thence through the Erie canal and the lake to Kingston, U. C. This remarkable voyage speaks well for the value of Lieut. Hunter's invention.

The bankrupt bill has become a law. Unluckily, it does not operate on banks.

Wheeling bank notes are at 15 per cent. discount below the other depreciated Virginia bank notes.

Another bank bill (or as now called, a bill to establish a "fiscal corporation,") has already been hurried through the lower house of congress, and will no doubt pass the senate. We *guess* again, and with very great confidence, that this bill also will be *vetoed.*

In a fire at Syracuse New York, a keg of gunpowder exploded, and 29 persons were killed outright, and about 50 dangerously or severely injured.

It is now said that there were nearly 300 persons on board the Erie, all of whom perished except 27.

The commission which has been for more than three months engaged in investigating the alleged frauds and malpractices in the New York Custom house, has at last adjourned to Boston, to make there a like scrutiny.

According to the report of the post office auditor, there were on the 4th of March last 3337 postmasters in arrears to the government.

The Circuit Court of Rankin county, Miss., at its late session, decided that a loan, made by a bank, of depreciated bank paper, being an usurious transaction, is *null* and *void*, and that *no collections should be enforced on debts thus contracted.*

At the meeting of some of the banks of this city, which was recently held for the purpose of considering whether the "Relief Bill" should be accepted by them or not, it was urged that if the banks did accept the bill, every loan they made in the currency authorized by the law would be void as an usurious transaction, and could not be collected. This view of the matter is now declared to be law by the decision in Mississippi. In the same state it was recently directed that the public officers should not receive depreciated paper in the payment of debts due the state. They are getting upon the right track in that quarter. —*Phil. Led.*

Down ! Down ! ! Down ! ! !—The stock of the United States Bank sold in New York on Monday for 12 per cent. for 100.—*Ib.*

England has now on the stocks or preparing, *twenty-seven* large steam vessels in addition to her present naval force.—*Ib.*

The new Steubenville Bank (Ohio) has broke, and its effects are placed in the hands of commissioners empowered to wind up its affairs.

By this morning's mails, (Friday 27th.)

The steamboat Louisiana, on the lower Mississippi had one of her boilers to burst, on the 12th inst., by which 5 men of the crew were scalded to death, or blown overboard and drowned, and several more severely injured. 12 or 15 of the United States' soldiers, of a party on board, were missing and supposed to be dead.

The land distribution bill had not finally passed the senate on the 25th.

It is now reported that the explosion at Syracuse

was of 25 kegs of gunpowder, and that it was ammunition provided for the designed outbreak of a new set of "Canadian patriots."

The most extensive swoop of "Lynch law" yet known, has lately occurred in Arkansas. A numerous and desperate gang of counterfeiters had established their quarters in a place of secure concealment near the Mississippi. A party of 100 men volunteered for the purpose, and by disguising their boat as a common trader, decoyed 27 of the gang of counterfeiters on board, who were secured and *forthwith drowned ! ! !*

The packet to France carries $62,000 of specie from New York.

The war in Florida, or the hunting and catching of Indians, is going on well. Two hundred and seven more Indians, who have surrendered or have been captured, are to be shipped from Tampa bay to the west on the 27th inst. Col. Worth expects the war to be ended in three months. *His* expectations are of some account.

The Danville branch of the Farmers' Bank of Virginia has been robbed by means of false keys to the vault, of $92,135 in bank notes, of which $72,000 were cancelled. These robbers, though successful, could not have been the "real Simon Pures" for such operations, (i. e. the bank officers,) or they would not have been such fools as to take *cancelled notes*, or *any notes*, if there was enough gold to be had instead. The president of the bank has advertised $5000 reward for the detection, and the public are "cautioned from taking" the cancelled notes, "as *they will not be redeemed by the bank.*" This "caution" *goes too far* —for if that is good ground for refusal, the public ought to refuse *all* the notes of the bank, as they are not, and (as long as possible to avoid it,) "will not be redeemed by the bank."

We beg to call attention, of the farmers of Virginia especially, and of the public in general, to one remarkable incident of recent and current banking history, to wit: that with all the indignation excited, and uttered, by and among the advocates or apologists of the banks, every thing has been directed to extraneous matters, altogether irrelevant to the main question of the effects of banking procedure; and not one fact, argument, or even one word, has yet been put before the public to defend or deny any abuse, or fraudulent operation of the system, of the many which we have endeavored to expose. The opposition, verbal or printed, to *our* facts and arguments in regard to the evils of banking, has been compounded principally of every possible charge that falsehood, calumny, envy and malice can rake up against our private as well as public life. How miserably weak must be any cause that is supported by such a course of *argument* as this! How utterly destitute must be the cause of the banks of every ground for defence, on the score of truth, honesty, and public utility, when from all the ready tongues and pens and presses at their command, not one word of reasoning, disproof, or even simple and plain denial, has been stated in their defence against any or all the many charges brought against them! Every dreaded opposer of the operation of the banking system may expect (for his sole reward, and as indirect testimony of the value of his services to the cause of truth,) to be denounced, slandered, and injured in every possible manner. But even if every such victim were, in his private life, as villanous and infamous as his worst enemies and slanderers would desire to have believed of him, *his* sins, certainly, would be no refutation of the facts and arguments brought against the actual operations of the *banks*, and the *banking system* of Virginia.

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